THE IRON TRADE REVIEW

Volume XLV CLEVELAND, SEPTEMBER 9, 1909 Number 11

RECORD BREAKING

IS BECOMING A FEATURE OF THE IRON TRADE.

Great Ore Movement—Increased Pig Iron Output—Buyers of Finished Products Anxious to Contract.

The continued activity of furnaces and mills is fortunately being accompanied by a strong conservative feeling, manifested particularly in the opposition of mills to the making of contracts for delivery next year. During the past few days, consumers of steel bars and other iron and steel products have been rather insistent in endeavoring to contract for their future requirements. While in a very few instances contracts running up to April 1 for bars and shapes have been made, leading interests are firmly resisting the making of contracts, although a goodly number expire Oct. 1, and many more at the close of the present year.

Pig Iron Production Indications point to a new record of pig iron production this month. Last month the number of furnaces in operation was increased 20 and the production amounted to 2,232,642 tons. A number of stacks will be blown in this month, and at Gary one new stack will be ready for blowing in each month during the remainder of the year. The Gary stacks will each have a rated capacity of 13,500 tons per month.

Iron Ore Conditions Shipments of iron ore in August made a new record, amounting to the immense total of 7,193,199 tons, a larger tonnage than was shipped in any entire year prior to 1890. The present outlook is that shipments for the year will exceed 42,000,000 tons. An important development in the eastern ore situation is the announcement that 400,000 tons of Swedish ore will be available for American use next year. Last year only 4,500 tons were imported from Sweden. The Cuban ore importation is now estimated at 1,800,000 tons, and the total foreign ore available for eastern furnaces next year exceeds 3,000,000 tons. In spite of the large increase expected in shipments from foreign lands, there is no probability of a surplus of the Lake Superior product.

Rails, Plates and Shapes The Illinois Steel Co. reports rail sales aggregating 100,000 tons, including 63,000 for the Chicago & North Western and 20,000 tons for a frog and switch company. The Carnegie Steel Co. has sold to Wabash 2,500 tons for this year. Inquiries are near closing on about 70,000 tons additional. The Southern railroad has purchased 28,000 tons of open-hearth rails from the Tennessee Coal, Iron & Railroad Co., and is in the market for 150,000 pair of rail joints. The leading interest has sold over a half million tons of shapes and plates to car building plants during the past few months. One recent order called for 13,000 tons. Four lake vessels ordered last week will require about 14,000 tons of shapes and plates. The sales of the American Bridge Co. for August amounted to 32,000 tons. Prices for fabricating show a much greater advance in the Chicago and Pittsburg districts than in eastern territory. The demand for plates is very active, and the increased requirements of the Pressed Steel Car Co., as a result of the settlement of the strike, will add to the troubles of the mills in that district in giving deliveries. Specifications on sheets are extremely heavy. Although the strike in the plants of the American Sheet & Tin Plate Co. continues, the number of mills in operation is gradually being increased. A sweeping injunction has been issued against the strikers at Youngstown by the common pleas court.

Corporation Activity The Steel Corporation's output of ingots for August was 1,260,496 tons, which is only 23,820 tons below the present record set in October, 1907. The Corporation is operating about 95 per cent of its blast furnace capacity.

Coke and Old Material There is still considerable excitement in the coke market, but many buyers consider present quotations entirely too high. Many of the contracts being made are on a sliding scale basis. Heavy offerings of scrap are being made by foreign countries, but few, if any, contracts have resulted.

Naval Contracts Awarded. — The navy department has signed contracts with the San Francisco Bridge Co. for the construction of the Pearl Harbor dry dock, Hawaii, for $1,760,000; and with the Maryland Steel Co. for the construction of a fleet collier at its bid of $889,000.

SUBSCRIBE TODAY

The first three issues of The Daily Iron Trade Review have been sent free of charge to subscribers to the weekly edition. Hereafter this will not be done.

Hence, it is important for all subscribers to the weekly edition who have not already subscribed to the daily, TO DO SO AT ONCE.

You cannot afford to miss a single copy of the daily, and we cannot promise to supply back numbers, as the supply is almost exhausted.

The Daily Iron Trade Review has been received most cordially and subscriptions are being received at a highly gratifying rate.

We wish heartily to express our gratitude for the many kind words of encouragement from all parts of the country.

The strike at McKees Rocks, Pa., has been happily settled, but the explanation of the pooling system and other causes of the unfortunate trouble is nevertheless intensely interesting and is worthy of study by all manufacturers. The story of the strike will be continued for several days in the daily edition.

THE WEEK IN IRON CENTERS

PITTSBURG.

Conservative Feeling Has Strong Influence on the Market.

Office of THE IRON TRADE REVIEW, 510 Park Building, Sept. 7.

The unprecedented rush of business within the short space of a month or six weeks has developed a distinct trait of unlooked-for conservatism among the leading interests, and more independent action. Market conditions in and about the Pittsburg district continue to reflect the greatest activity, without excitement, flurry or run-away features. The bookings would undoubtedly be larger than they are at present, were it not for the elimination of speculative option orders, which have been permitted for many years, but, during the present activity, have been avoided to such an extent that actual specifications are being asked for with the orders, so that tonnages now on the books have delivery dates attached. The outlook, if the present rate of increase in new business continues—and there is no reason to believe it will not—is that it will not be long before mills will not be able to deliver full orders, but will be compelled to apportion their rollings, as was the case before the panic of two years ago.

The only advances in prices during the past week have been on all grades of pig iron, oil country pipe and casing, and on cold rolled and ground shafting. Pig iron advanced 25 to 50 cents per ton, and oil country pipe and shafting $2 per ton. In all other lines the prices are firm and the only advance expected in the near future is on spikes. The merchant pipe interests are non-committal and have given no intimation of what they expect to do.

The scarcity of semi-finished steel, both Bessemer and open-hearth, is a notable feature in the situation. The increased demand for finished products has about exhausted the surplus of the leading manufacturers and they are retaining their whole supply for their own needs and practically withdrawn from the market as sellers of semi-finished steel. This action has had the tendency to advance the prices on billets and sheet and tin bars, or at least make them exceedingly firm at the going quotations. The Republic Iron & Steel Co. broke all records of steel production at the Bessemer plant in Youngstown, in August, turning out 55,253 tons, finished weight.

The unannounced advance in the price of all grades of pig iron has apparently put a temporary check on the big buying movement that was under way, and while negotiations have not been dropped on several of the large inquiries out last week, they are not as active and the situation is one of sparring for time. Only the action of one furnace, not strictly in the valley, in announcing for a time $16 valley on No. 2 for first quarter of next year, prevented a still greater advance in this grade.

The settlement of the strike at the McKees Rocks plant of the Pressed Steel Car Co., will undoubtedly bring full operation to this large industry within a short time. Edith furnace of the Steel Corporation went in blast this week, the Nevelle Island furnace being temporarily out of commission on account of an accident.

Pig Iron.—The almost universal advance in prices by all furnaces has apparently temporarily stopped the big buying movement in foundry iron, but from the tone of inquiries still in the market and those not acted upon prior to the advance, the delay will not be for long. One of the principal producers in the valley has withdrawn from the market for iron over the remainder of the year, and whether this means that the furnace has sold up to its capacity for this period or is holding out for better prices during the last quarter is still a matter of question. Since last week, the Pittsburg Plate Glass Co. has purchased 1,500 tons of No. 2 at an average slightly over $16, valley, and another large consumer in Pittsburg has purchased 2,000 tons at about the same figure. The Philadelphia inquiry for 20,000 tons of basic has not been closed, but is still pending. The Jones & Laughlin Steel Co. has purchased 10,000 tons of Bessemer at $16.75, valley. One of the southern furnaces is quoting $14, Birmingham, on No. 2 for the first quarter delivery, and another furnace in the same district, which has already sold considerable iron at this figure has advanced its price to $14.25, Birmingham, for first quarter.

The spot market on Bessemer iron is $17, valley, and on No. 2 northern not less than $16 at the furnace. The supply of basic iron for nearby delivery is very low, and we quote a minimum of $15.75, valley. On Tuesday 350 tons of Bessemer were sold at Pittsburg for September and October delivery at $17.

On prompt and for shipment over the remainder of the year, we quote on northern iron as follows:

Bessemer, valley	$16.75 to 17.00
Bessemer, Pittsburg	17.65 to 17.90
No. 2 foundry, Pittsburg	16.90 to 17.15
Gray forge, Pittsburg	15.90 to 16.15
Basic, valley	15.75 to 16.00
Basic, Pittsburg	16.65 to 16.90

Ferro-Alloys.—The advancing movement in ferro-manganese continues. Some sellers are now asking $44 for this year and $45 for next, but lots have been booked the past week at a shade under $43. Several thousand tons of new inquiry appeared this week, including one large lot for next year's shipment, and most of this was for consumers outside of the Pittsburg district. There is not a great deal of uncovered requirement over this year in this market. Fifty per cent ferro-silicon is firm at quoted prices. Some of the domestic makers of the lower grades of ferro-silicon are still active in taking business at low prices. The foreign grades are several dollars above the domestic.

We quote ferro-manganese at from $42.50 to $43.50, Baltimore, prompt shipment, or for delivery this year and the first half of 1910, $44 to $45, Baltimore. The freight from Baltimore to Pittsburg is $1.95.

Fifty per cent ferro-silicon is quoted at $65 to $66, Pittsburg; domestic, 12 per cent, $25; 11 per cent, $24; 10 per cent, $23, Pittsburg.

Wire Rods.—Some makers of wire rods are not actively seeking business, but there is little being offered anyway and we quote the market nominally at $31.50, Pittsburg, on Bessemer, and $32.50, Pittsburg, on open-hearth rods.

Plates.—From the standpoint of present outlook it will be only a question of a short time before the leading plate makers will find it necessary to resort to their boom-time methods of apportioning output among regular trade on a ratio to their usual requirements. At the rate business is now being booked, and the policy adopted of specifications accompanying orders, which is being carried out to an extent greater than ever heretofore, mills are filled to their rolling capacity for from six to eight weeks ahead and definite delivery promises are being made for from six to eight weeks and

only where specifications accompany the orders. This policy means that the steel car companies, ship yards, large buyers of steel skelp, and the large fabricators, in order to insure a steady supply of steel, during the latter part of the year when mill conditions will undoubtedly be more congested than they are at present, have taken notice of this policy and are specifying freely and as far ahead as it is possible to figure, and possibly a little further on speculation. Many of these interests are reaping the benefit of early action in ordering before the recent advance. Lake ship yards are now figuring with local plate makers on steel for five lake bulk freighters for 1910 delivery, but negotiations have not advanced far enough to make definite announcement for whom the vessels are. No large contracts for cars were announced during the week. The settlement of the strike at the McKees Rocks plant of the Standard Steel Car Co. will probably be followed by some announcement of this kind. We quote the present market as follows:

Tank plates, ¼-inch thick, 6¼ to 100 inches, 1.40c to 1.45c, mill. Extras are as follows, per 100 pounds: Boiler and flange steel plate, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.20c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches, up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edge, 0.10c; under 3/16 to and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—The sheet specifications received by the leading interest during the past week have been almost double those of the average normal week, and reports from independents are to the effect that this holds good with most of them. Delivery promises on sheet products are being extended, so that at the present time on the common products promises are four to six weeks, and in other than common products the producers are further behind. The leading interest during the past week made a gain of two sheet mills over the previous week, having 150 in operation. There has been no intimation of an advance in prices, although much of the heavy buying, particularly by jobbers during the past 10 days, was probably due to anticipation of such action, and many of the independent manufacturers are quoting $1 in advance of the price of the leading interest. We quote present minimum prices as follows:

Blue annealed sheets, Nos. 3 to 8, 1.60c; Nos. 9 to 10, 165c; Nos. 11 and 12, 1.70c; Nos. 13 and 14, 1.75c; Nos. 15 and 16, 1.85c; box annealed sheets, Nos. 10 to 12, 1.85c; Nos. 13 and 14, 1.90c; Nos. 15 and 16, 1.95c; Nos. 17 to 21, 2c; Nos. 22 to 24, 2.05c; Nos. 25 and 26, 2.10c; No. 27, 2.15c; No. 28, 2.20c; No. 29, 2.25c; No. 30, 2.35c; galvanized sheets, Nos. 13 and 14, 2.25c; Nos. 15 and 16, 2.40c; Nos. 17 to 21, 2.50c; Nos. 22 to 24, 2.65c; Nos. 25 and 26, 2.85c; No. 27, 3.05c; No. 28, 3.25c; No. 29, 3.40c; No. 30, 3.65c; painted roofing sheets, $1.55 per square for No. 28 gage, 2½-inch corrugation, and galvanized roofing sheets, $2.80 per square for No. 28 gage, 2½-inch corrugation.

Tin Plate.—The leading interest during the past week made a gain of six mills in its tin department, and is now operating 145 mills. Record tonnages are being booked both by the leading interest and by the independents, but no price changes are announced, either for nearby or future deliveries. Some independents are quoting an advance of about $3 per ton over present prices for next year, but this action is not official or general, the inclination being to delay establishing this price until nearer the time the bulk of the business is to be placed.

Coke tin plate, 100-pound basis, 14 x 20, $3.40 to $3.65 f. o. b. mill, Pittsburg district. Terms 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—The Southern railroad has purchased 28,000 tons of open-hearth rails from the Tennessee Coal, Iron & Railroad Co., and is in the market for 150,000 pairs of rail joints, which the Tennessee company does not make. Several of the large railroads have intimated they will enter the market, but up to date the inquiries have not reached the stage of active negotiation, although in a tentative way mill reservations have been made for at least a part of next year's requirements. There is an active inquiry and a fairly large sale of joints and track fastenings from all parts of the country, but inasmuch as these orders are not accompanied by rail inquiry, as is usually the case, the inference is that they are to be used on improvements without new rails. The spike market is firm at 1.70c, Pittsburg, minimum on standards with a good inquiry and large bookings since the first of the month. We quote the market on Bessemer rails as follows, the base price for open-hearth rails being $30, mills:

Fifty-pound and heavier, 500-ton and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 8-pound, $31; 12-pound, $30; 16 to 25-pound, $29; 30 to 35-pound, $28.75; 40 to 45-pound, $28; angle splice bars for standard sections, 1.50c, Pittsburg; standard spikes, 1.70c to 1.75c, Pittsburg; hand spikes, 1.75c to 1.85c, Pittsburg.

Steel.—The three large producers of semi-finished steel in the Pittsburg district are practically out of the market and are now quoting only in special instances for the protection of old customers. Bessemer and open-hearth sheet bars are quoted $26 to $26.50, Pittsburg, and forging billets $30 to $30.50. Open-hearth billets are so scarce on account of the heavy demand by finishing mills of the producers that it may safely be said that there is no market except as has been noted in the case of old customers. The Republic Iron & Steel Co., during August, broke all records of steel production at its Bessemer plant, Youngstown, O., the total being 55,253 tons finished weight.

Bessemer 4 x 4 billets with 0.25 carbon and less are regularly quoted at $25 to $26, Pittsburg, with the usual extras for size and analysis, and open-hearth rolling billets from $26.50 to $27.50, Pittsburg. Forging billets are held at $28 to $30, Pittsburg. Sheet and tin bars are quoted at $26.50 to $27, Pittsburg.

Hoops and Bands.—With some of the large makers beginning to enter the market for extended requirements, the increased strength noted in hoops for the past several weeks is developing nicely. Specifications from the miscellaneous trade are good and prompt deliveries are no longer easy to obtain. The concessions made in hoops on desirable business seem to have disappeared. Bands are firm at 1.35c, Pittsburg. We quote the market as follows:

Hoops in carload lots, 1.50c to 1.60c; in less than carload lots, 1.60c to 1.70c; bands, 1.35c to 1.40c, base half extras as per standard steel.

Merchant Bars.—The only price change on the bar schedule has been an advance of $3 a ton in shafting which is now quoted 57 off in carloads and 52 off in less than carloads, the change having gone into

effect Sept. 1. Manufacturers of merchant bars are literally swamped with business and deliveries have been extended from six weeks to as long as three months on some sizes. Prices are exceptionally firm with an absolute minimum of 1.35c, Pittsburg, although 1.40c, Pittsburg, is the ruling market. Specifications on bar orders are unusually heavy in all lines and this is particularly true on steel bars for reinforced concrete work, where contractors are anxious to close their work in before cold weather. The recent dissension in the ranks of cold rolled and ground shafting manufacturers has been eliminated and the market is very strong at full prices all along the line. We quote the present market as follows:

Common iron bars, 1.50c to 1.55c, Pittsburg; Bessemer and open-hearth steel bars, 1.35c to 1.40c minimum; plow and cultivator, 1.35c to 1.40c; channels, angles, zees, tees, under 3-inch, 1.45c; all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 57 per cent in carloads and 52 per cent in less than carloads, delivered in base territory. Planished and machine straightened tire is 1.55c base; iron finished tire under 1½ by 1½ inches, 1.50c, both plus ½ extra on tire card; iron finished tire, 1½ x ½ and over, 1.35c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and thicker, we quote base prices for 100 pounds, $3.05 on hard, and $3.30 on soft.

Structural Material.—This market is in a very healthy condition and while fabricators during the past week have not taken on any large business, they are very well satisfied with getting out what they have and are pleased with the outlook. Several projects, which, from their nature are not usually taken up in the fall, as their carrying out would necessitate outdoor winter work, are in contemplation. The going business at present involves small tonnages, but the number totals up a considerable tonnage. The urgent requests for mill shipment of material needed to finish up present construction jobs before cold weather, are keeping mills running practically to capacity on plain material and fabricators are rushing it through as rapidly as possible. We quote the market on structural shapes as follows:

Beams and channels, 15-inch and under, 1.40c to 1.45c; over 15 inches, 1.50c to 1.55c; zees, 1.40c to 1.45c; tees, 1.40c to 1.45c; angles, from 3 to 6 inches, 1.40c to 1.45c; over 6 inches, 1.50c to 1.55c; universal and sheared plates, 6¼ inches wide and wider, 1.40c to 1.45c.

Wire Products.—The bulk of the new business now being booked is from the manufacturing trade, jobbers having filled up stocks at lower prices and are in comfortable shape. The fall farm and jobbing business will not be busy for a month or so. Prices are firm on all commodities and we quote as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85; painted barb wire, jobbers' carload lots, $1.80; retailers' carload lots, $1.85.

Boiler Tubes.—Some fair orders are being placed with the makers of iron locomotive tubes, and there is a moderately better buying generally by the railroads. The merchant trade, however, is still recuperating very slowly. Prices in tubes are rather irregular. We quote the following official discounts on lap-welded steel boiler tubes to jobbers in carloads:

1 to 1½ inch	50
1¾ to 2¼ inch	62
2½ inch	64
2¾ to 5 inch	70
6 to 13 inch	62

2½ inch and smaller, over 18 feet, 10 per cent net extra.
2¾ inch and larger, over 22 feet, 10 per cent net extra.

To destinations east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg.

We quote the following official discounts on charcoal iron tubes to jobbers:

1 to 1½ inch	45
1¾ to 2¼ inch	45
2½ inch	50
2¾ to 5 inch	57
6 to 13 inch	45

Merchant Pipe.—The advance last week of one point or $2 a ton in oil field goods and by some iron merchant pipe makers has directed increased interest by both makers and buyers in the price situation on merchant steel pipe, but no change has been announced by the leading maker. An advance is expected soon, however. Some makers report increased tonnages booked in August while with others the month was not quite so good in the aggregate as July. Some mills are sold up on some sizes for more than 30 days ahead. The new inquiry that has appeared in this market is for 15 miles of 6¼-inch casing for eastern shipment. Another order for 15 miles of large pipe will soon be placed. We have revised our prices and quote the following official discounts on merchant pipe subject to an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	72	56	66	..
⅜ inch	73	59	67	53
½ inch	76	64	70	58
¾ to 6 inch	80	70	74	64
7 to 12 inch	75	60	69	52
PLUGGED AND REAMED.				
1 to 4 inch	78	68	72	62
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	65	53	59	47
½ to 4 inch	72	60	56	54
4½ to 8 inch	68	56	62	50
DOUBLE EXTRA STRONG PLAIN ENDS.				
½ to 8 inch	61	50	55	44

Coke.—While the coke market is still excited over the prospects of high prices for next year, a considerable portion of the talk is vaporings of overwrought imaginations, and comes to a large extent from operators outside of the Connellsville region. A number of the operators in the Uniontown district in particular, are not in position to quote on coke for next year deliveries, if they were offered the business at this time, as their plants are under option by the promotors of the proposed consolidation of interests that has been under way for the past year. These options do not expire until Oct. 1 and until that time the owners are tied down to the option and do not know definitely what is going to happen. Spot furnace coke is quoted at $2.10, ovens and contracts over the remainder of the year can be made at from $2.25 to $2.35 at the ovens. Very little business has been done running into next year, most of it is on a sliding scale basis and the price will not be determined until after the coke is delivered and used. The excitement of the past two weeks has had its effect in that it has materially interfered with legitimate transactions.

Furnace men who say that nothing less than an 8 to 1 ratio of pig iron to coke should prevail under present conditions, point to the fact that $2.50 coke means $20 iron for first half. These same furnaces have pegged their ideas of the iron market for first half around $18 valley for Bessemer which the basis of their figuring would make $2.25 to $2.35 coke. During the depression, the ratio of pig iron to coke scaled down to about 10 to 1 in some cases. Old-time coke men view the present excited condition of the market with conservatism and call attention to the low prices at which finished materials are selling. It is estimated that 95 per cent of the furnace coke consumers are covered for their needs over this year at low prices. Foundry coke prices range from $2.10 to $2.35 for prompt and from $2.25 to $2.65

on contract. The Connellsville *Courier's* figures for the week ending August 28 show 32,131 ovens active with an output of 416,354 tons compared with 30,962 active ovens and a production of 397,979 the previous week.

Old Material.—An interesting development in the scrap market has been the increased offering of material to prominent Pittsburg steel interests by Canadian dealers who are seeking any advantage to be gained under the reduced duty on old material. As large local consumers are strictly avoiding the scrap market at present, these overtures have not progressed far toward transactions. Most of the Canadian accummulations offered have been in agricultural grades. The dealers still dominate the market and there is a small buying volume under way. One large buyer has been offering $16.75 delivered for heavy steel, but has not been able to get much response at this figure, because the present market ranges from $17 to $17.50 delivered. The mills continue to use heavy percentages of pig iron in their melt. Some of them are frequently sellers of low phosphorus scrap, but they are offering very little at present, as they are consuming practically all their own production in their operations. Foundry interests which have been seeking tonnage of this grade claim to have made some purchases under $21 Pittsburg. The whole market is very strong owing to the dealers' bullish attitude. The Pennsylvania railroad will make awards Sept. 10 on its August list. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap	$17.00 to 17.50
Re-rolling rails	17.00 to 17.50
Bundled sheet scrap	15.00 to 15.50
Iron axles	25.00 to 26.00
Old iron rails	19.00 to 19.50
No. 1 wrought scrap	17.25 to 17.75
Old car wheels	17.00 to 17.50
Low phosphorus	20.50 to 21.00
Machine shop turnings	12 50 to 13.00
Cast borings	10.75 to 11.00
No. 1 cast scrap	16.00 to 16.50
Malleable	15.25 to 15.75
Stove plate	12.00 to 12.50

CLEVELAND.

Mining Companies Busy—Consumers of Bars Want to Contract.

Office of THE IRON TRADE REVIEW,
Browning Building, Sept. 7.

Iron Ore.—Mining companies are rushing shipments and doing their utmost to meet the demand for ore, but it is evident that some belated buyers will have difficulty in placing orders to meet their requirements. Recent publications in regard to prices of iron ore for next year have no foundation except talk in the trade heretofore mentioned in these columns or indicating a probable advance.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer $4.00; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—Inquiry for all grades of pig iron continues active and is especially noticeable because of the fact that buyers as far east as Philadelphia and as far west as Davenport, Iowa, are seeking to place orders in this territory. The eastern inquiries are for basic, while most of those from the west are for foundry and malleable. One selling agency has recent inquiries on 150,000 tons during the month ending today and has not quoted on any of it, as it has on its books all the business it desires at present. A round tonnage Bessemer prompt shipment has been sold at $17, valley. For No. 2 foundry, Cleveland furnaces are quoting from $16.75 to $17.25 delivered for prompt iron and $17 furnace for the first half of next year. For prompt shipment, we quote delivered in Cleveland, as follows:

No. 1 foundry	$17.25 to 17.50
No. 2 foundry	16.75 to 17.25
No. 3 foundry	16.50 to 17.00
No. 2 southern	17.85
Gray forge	15.25 to 15.50
Bessemer	17.65 to 17.90
Lake Superior charcoal	19.50 to 20.00
Jackson Co. 8 per cent silvery	20.05

Coke.—Excitement in the coke market noted last week has continued and very little of either furnace or foundry grades is available for the remainder of this year. The labor shortage in the Connellsville region is catusing a great deal of trouble and there is not a very good prospect of obtaining more laborers at an early day. For furnace coke for the first half, $2.50 is now the minimum, while for prompt delivery $2.10 is the lowest price. On foundry coke, quotations for the first half range from $2.65 to $3 and for spot coke $2.40 seems to be the minimum.

Finished Materials.—Many consumers are endeavoring to make contracts, some for their requirements up to Jan. 1, and some for the first half of next year, but the mills are very slow to commit themselves. The Steel Corporation is extremely slow to make any kind of a contract. While some of the independent companies are showing a little more disposition to make contracts, they also are conservative. In all cases, full prices have been made. Old customers in some instances have been taken care of up to April 1 at present quotations. Eastern Pennsylvania mills are advancing their quotations on plates; 1.55c Coatesville or 1.65c Pittsburg are now being asked on universals. One buyer of steel bars has been trying to contract for 15,000 tons for the first half of next year, but without success. The iron market is firmer. The iron mills will no doubt receive considerable tonnage owing to the failure to deliver steel bars on contract time.

Old Material.—The market holds very strong and some quotations are higher. Although trade is rather quiet, holders are experiencing no difficulty in maintaining prices. With the prices on finished material as they are now, many users claim that they cannot afford to buy old material at the present market. We quote f. o. b. Cleveland, as follows:

Old iron rails	$18.50 to 19.00
Old steel rails (re-rolling)	16.50 to 17.00
Old steel rails (under 6 feet)	16.50 to 17.00
Old car wheels	15.50 to 16.00
Old steel boiler plate	14.00 to 14.50
Malleable iron (railroad)	16.00 to 16.50
Steel axles	19.00 to 19.50
Malleable iron (agricultural)	14.00 to 14.50
Heavy steel	15.50 to 16.00
Country mixed steel	14.00 to 14.50
Low phosphorus	18.50 to 19.00

We quote, net tons, as follows:

No. 1 R. R. wrought	$15.00 to 15.50
No. 1 busheling	14.00 to 14.50
No. 1 machine cast	14.00 to 14.50
Iron axles	20.00 to 21.00
Axle turnings	11.50 to 12.00
Machine shop turnings	10.00 to 10.50
Grate bars	12.00 to 12.50
Pipes and flues	12.50 to 13.00
Tank iron	11.50 to 12.00
Hoop and band iron	9.50 to 10.00
Sheet iron	8.00 to 8.50
Wrought drilling	10.00 to 10.50
Stove plate	11.50 to 12.00
Cast borings	8.00 to 8.50

CINCINNATI.

Southern Pig Iron Advances to $14 for Prompt and Next Year's Delivery.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Sept. 7.

Pig Iron.—Although the tonnage of pig iron sold in this market the past week was not large, a strong tone has prevailed and quotations are 50 cents per ton higher than a week ago for both northern and southern iron for delivery this year. Sales of southern pig iron were made late last week on the basis of $13.50 Birmingham for this year's delivery and while it is possible that this price could still be done for a limited tonnage, a careful canvass of furnace prices in the southern district fails to locate a producer quoting below $14.00 Birmingham for this year's delivery. There is still some investment iron obtainable, but commission houses and brokers are inclined to follow furnace asking prices for the iron under their control, and the

situation seems to justify a quotation of $14.00 Birmingham basis for southern iron for prompt shipment or delivery over the remainder of this year. For next year, $14 is asked for first quarter delivery, but the furnaces do not seem disposed to place this quotation in the hands of selling agents without limitation, and practically all sales are submitted to furnace companies for confirmation before deals are closed. In southern Ohio, the asking price for No. 2 foundry is $16.00 at furnace for this year's delivery; and, although a number of the furnaces are asking $16.50 for the first half of next year, $16.00 can still be done in the southern Ohio district. There is but little inquiry for prompt shipment or rest of the year, as consumers are apparently covered with contracts on which the furnaces are making shipments, so that, from now until the end of the year but little business is expected to develop for prompt shipment. There is not a large tonnage of free iron apparently available in the south, however, and, with the market firm at $14.00 for next year, furnaces are not disposed to urge prompt iron upon the market. The leading pipe interest is inquiring for a liberal tonnage and has purchased 2,000 tons in this market during the week and an eastern pipe maker is inquiring for 2,400 tons for October-November shipment. A Detroit melter came into the market for from 8,000 to 10,000 tons of foundry iron for next year's delivery and has closed for a part of the tonnage with furnaces in that district. A sale of 5,000 to 10,000 tons of steel making irons for deliveries commencing at once has been made to an Ohio consumer. The gray forge market is difficult to locate, as offerings and inquiry in this district are light. There is no change in high silicon iron in the Jackson County district but $19.00 furnace is being asked for next year's delivery for 8 per cent, with the usual differences for higher or lower silicon. We quote for prompt delivery and delivery over the remainder of the year, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton as follows:

Southern foundry No. 1	$ 17.75
Southern foundry No. 2	17.25
Southern foundry No. 3	16.75
Southern foundry No. 4	16.25
Southern No. 1 soft	17.75
Southern No. 2 soft	17.25
Southern gray forge	15.00 to 15.50
Northern No. 1 foundry	17.70
Northern No. 2 foundry	17.20
Northern No. 3 foundry	16.70
Jackson county 6 per cent silicon	18.70
Jackson county 8 per cent silicon	19.70
Jackson county 10 per cent silicon	20.70

Finished Material.—Specifications on contracts have been liberal, especially considering that the first week in the month is usually smaller than the succeeding week. Jobbers are reporting an active demand and mill deliveries are from 4 to 8 weeks behind, which is resulting in some premium being paid above the contract basis when a mill can be found so situated as to guarantee earlier delivery than could be obtained on the contract. Prices are unchanged but rule strong with steel quoted on the basis of $1.35 Pittsburg for carload lots.

Coke.—In some districts, the market is considerably excited and prices are advancing. Foundries are increasing their requisitions for coke and the demand for spot furnace coke for prompt shipment is improving. It is reported that car shortage is gradually developing in the coke producing districts and there is a scarcity of labor in all fields. Quotations in the leading coke producing districts are as follows, f. o. b. ovens:

	Prompt shipment.	Remainder of year.	First half 1910.
Connellsville district:			
Fdy. coke.	$2.10 to 2.35	$2.25 to 2.50	$2.65 to 2.85
Fur. coke.	1.90 to 2.10	1.90 to 2.10	2.35 to 2.75
Wise county district:			
Fdy. coke.	2.10 to 2.25	2.10 to 2.25	2.25 to 2.35
Fur. coke.	1.85 to 2.00	2.00 to 2.20	2.10 to 2.35
Pocahontas district:			
Fdy. coke.	2.00 to 2.10	2.10 to 2.25	2.25 to 2.35
Fur. coke.	1.85 to 2.00	1.85 to 2.00	2.25 to 2.35

Old Material.—The market is firm, but prices show no material change. Dealers are showing more inclination to sell for forward delivery when some kind of a sliding scale basis of prices can be agreed upon with the consumer; but are demanding full prices on inquiries on any large tonnage. Heavy melting steel is little more freely offered, as the principal consumer in this market is filled up and has stopped deliveries on some contracts. Railroad lists contain only moderate tonnages and although dealers have liberal supplies, they are firm holders. Dealers' prices to consumers here are as follows:

Old No. 1 R. R. wrought net tons	$14.50 to 15.00
No. 1 machinery, net tons	13.50 to 14.00
Old iron rails, gross tons	15.00 to 16.00
Old steel rails (re-rolling) gross tons	14.00 to 14.50
Old short lengths, gross tons	13.50 to 14.00
Old iron axles, net tons	17.00 to 17.50
Heavy melting scrap, gross tons	14.50 to 15.00
Stove plate, net tons	10.50 to 11.00
Heavy turnings, net	9.50 to 10.00
Cast borings, net tons	8.00 to 8.50
Car wheels	14.50 to 15.50

SEATTLE.

Evidence of Genuine Prosperity, But Pig Iron is Still Dull.

Office of THE IRON TRADE REVIEW,
302 Pioneer Bldg., Sept. 3.

There is more evidence of real prosperity in the business atmosphere of the Pacific coast at present than there has been at any time since October, 1907. Several building projects are forming in north coast cities which presage an active demand for structural material. The scrap market is more active; the foundries are doing a little better and the demand for sheets and similar finished materials continues unprecedented.

Industries dependent upon railroad orders are active. The Seattle Car Mfg. Co., Seattle, is building 200 freight cars for the Northern Pacific. The Westerman Iron Works, Seattle, is executing an order for crossing frogs and switches. The Tacoma plant of the Griffen Wheel Co. is doing well and the South Tacoma shops of the Northern Pacific are working under pressure in anticipation of the fall demand for rolling stock.

Pig Iron.—Pig iron still continues the dull feature of the market. Prices are however, firm with a tendency to advance. In face of an advancing English market, Pacific coast prices for pig iron are sure to rise and the present lassitude of buyers is hard to explain, specially in view of the abundant tonnage in the dealer's hands. Owing to the recent arrival of various shipments, the stocks of unsold iron in the dealers' hands are unusually large and spot iron is correspondingly depressed. It is doubtful if the Pacific coast market was ever in a more attractive condition from a buyer's standpoint than it is at present.

We have revised our prices and quote as follows:

English, Cleveland, No. 1, spot	$23.00 to 24.50
English, Cleveland, No. 1, to arrive Sept.	23.50 to 24.00
English, Cleveland No. 1, to arrive Dec.	22.50 to 23.00
English, Cleveland, No. 1, to arrive Feb.-March	21.50 to 22.50
Glengarnock, Scotch, to arrive September	25.00
Southern No. 2, domestic	23.60 to 24.00

Merchant Iron.—Sales are increasing but prices remain unchanged. The confidence of the mills in the future is evidenced by the recent purchase of 20,000 tons of soft piling scrap by the Pacific Hardware & Steel Co., as noted in these columns Aug. 26. This scrap will be rolled at the Portland mill of the Pacific Hardware & Steel Co., which rolls merchant bars exclusively. We quote base prices per 100 pounds, f. o. b. Seattle as follows: Common iron bars, $2.10; mild steel bars, $2.25; machinery steel, $2.75; Norway iron, $3.50; angles, channels, zees and tees, under 3 inches, $2.75.

Sheets.—Extensive sales of both plain and galvanized sheets continue with undiminished vigor. Prices are stationary. We quote, f. o. b. Seattle, as follows: Blue annealed sheets, No.

12, 2.95c; No. 14, 3c; No. 16, 3.10c; Nos. 22 to 24, 3.35c; No. 28, 3.70c. Galvanized sheets, Nos. 10, 12 and 14, 3.60c; No. 16, 3.70c; Nos. 22 to 24, 4.10c; No. 28, 4.70c.

Old Material.—The recent purchases of the Pacific Hardware & Steel Co., together with the expected opening of the Irondale steel plant, has revived interest in wrought iron and steel scrap. Conditions point to a lessening of the export shipments of this product from the Pacific coast in the near future. Foundry scrap is in fair demand. We quote net tons as follows, f. o. b. Seattle:

Foundry and machinery scrap	$19.00 to 20.00
Old car wheels	16.50 to 17.00
Railroad wrought	10.00 to 11.00
Country wrought and busheling	5.00 to 8.00

PHILADELPHIA.

Demand for Basic Pig Becomes Insistent—Prices are Irregular.

Sept. 7

Pig Iron.—Selling of basic iron continues to contribute most heavily to current business in this territory. During the past week a number of eastern steel works have taken on moderate blocks of iron, among them being one lot of 7,500 tons, three lots of 3,000 tons each and sufficient scattered tonnages to aggregate 20,000 or 25,000 tons. This was practically all for delivery during the first quarter or first half of next year and was sold at $18, delivered. There is still a large unsatisfied call for basic for delivery over the balance of the year and practically all consumers are actively interested in first half iron, as the selling which has been done has by no means covered their probable requirements except in the case of one steel interest. Virginia basic is now held at $18.50, delivered in this territory; this is also the quotation of some eastern Pennsylvania plants, but no business is being taken at this figure. Foundry iron is selling briskly in lots ranging from 100 to 1,000 tons, chiefly for shipment over the balance of the year, but there is a growing and more insistent demand for the first half. Prices are irregular, as occasional advances are being announced by furnaces which have sold up as heavily as they desire. The minimum on the more popular brands is now $17.75, delivered for No. 2X, and some makers are holding as high as $18.35, while for first half the figures are generally 50 cents higher. Cast iron pipe makers are finding it practically impossible to secure low grade iron in good tonnages, even at higher prices, and it is evident they will have to melt No. 2 plain iron heavily; they are in the market for large lots. The low phosphorus, malleable and charcoal markets are without feature. The blowing in of the large Crane stack at Catasaqua has been delayed, but is set for today. We quote, delivery over the balance of the year at eastern Pennsylvania plants, as follows:

No. 1X foundry	$18.25 to 18.75
No. 2X foundry	17.75 to 18.25
No. 2 plain	17.25 to 17.75
Standard gray forge	16.75 to 17.25
Basic	18.00 to 18.50
Low phosphorus	20.50 to 21.00
No. 2 Birmingham	17.50 to 18.00
No. 2X Virginia	18.00 to 18.50
No. 2 plain Virginia	17.50 to 18.00

Finished Materials.—The market presents few developments other than a gradual firming-up toward a higher level, following the elimination of the few weak spots in the situation. Prompt forging billets are scarce and $29.00, eastern mill, is now the minimum; rolling billets are firm at $27, mill, for early shipment. Some good plate orders have been placed recently, and mills are running to capacity; the minimum price is 1.55c, with occasional sales at $1 and $2 per ton higher. The same is true of structural shapes, the leading producers of which are sold up for some time. Important bar tonnages for delivery running over the first quarter are noted at 1.40c, Pittsburg. The Lackawanna Steel Co. will supply 500 tons of steel piling for the Curtis building, but no structural lettings of size are reported. Rail manufacturers in this district are making little effort to secure 1910 business as yet. We quote: Structural shapes and plates, 1.55c to 1.60c; sheets No. 28, 2.80c; steel bars, 1.50c to 1.55c; refined bar iron, 1.45c to 1.50c.

Old Material.—Mills in the joint purchasing arrangement are understood to be securing a good volume of scrap at $17, delivered, or slightly higher, while outside interests are making somewhat higher offers. The situation, however, shows no material change from that reported a week ago and the prices for gross tons, eastern Pennsylvania delivery, noted below, are practically the same:

Old steel rails (rerolling)	$18.25 to 18.75
No. 1 steel scrap	17.25 to 17.75
Old steel axles	22.50 to 23.00
Old iron axles	24.50 to 25.00
Old iron rails	20.00 to 21.00
Old car wheels	16.00 to 16.50
Choice scrap R. R. No. 1. wrought.	19.50 to 20.00
No. 1 yard scrap	18.00 to 18.50
Machinery scrap	15.75 to 16.25
Low phosphorus scrap	20.50 to 21.00
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	15.50 to 16.00
No. 2 forge fire scrap, ordinary	9.50 to 10.00
Wrought turnings	14.00 to 14.50
Axle turnings, heavy	14.00 to 15.00
Cast borings	12.00 to 12.50
Stove plate	14.00 to 14.50

The Stewart Iron Co., Ltd., blew out its Sharon, Pa., blast furnace, Aug. 21 for repairs.

BUFFALO.

Pig Iron Quotations Slowly Advancing—Market Strong.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, Sept. 7.

Pig Iron.—The market continues to stiffen, but slightly. This feature is more noticeable on forward tonnage. The market condition here this week warrants a revision of prices, an advance of 25 cents a ton. The minimum price on No. 2X foundry has advanced from $15.75 to $16, while maximum price on same grade is $16.25, but these quotations can be relied upon for prompt delivery only, as orders for forward tonnage run 50 cents higher. The week past was strong. Negotiations took place for a considerable tonnage while a fair amount was placed. Some foundry interests are looking for more iron than heretofore. Foundries and furnaces appear satisfied of a good business outlook. We quote f. o. b. Buffalo, prompt delivery, as follows:

No. 1X foundry	$16.25 to 16.75
No. 2X foundry	16.00 to 16.25
No. 3X foundry	15.25 to 15.75
No. 2 plain	15.75 to 16.00
Malleable Bessemer	16.00 to 16.50
Gray forge	15.25 to 15.50
Charcoal	19.50 to 20.50

Finished Products.—Current business is strong. Specifications in this respect call for some heavy tonnage. Quiet marks the structural and fabricated conditions, possibly due to three days ending Labor Day, when most business offices were closed. No substantial lettings have occurred. Some fair business is said to be developing. Deliveries on bars, angles and small shapes are running further behind and it would be difficult to get this material from the mills within eight weeks. Structural material and plates may be had, in some cases, with fair promptness, this being about four weeks. One interest has advanced to 1.40c, Pittsburg, on steel bars, but there are leading interests accepting bar tonnage at 1.35c, Pittsburg, base.

The N. & G. Taylor Co., manufacturer of tin plate, Philadelphia, announces that orders have been given to put the entire reserve capacity of its mills in operation, increasing the output of the black plate mills about one-third. The company is encountering exceptionally heavy orders for tin plates and also for billets, which are produced in sizes from 1½ to 2½ inches. The works of this company were run continuously during the depression, both at Philadelphia and at Cumberland, Md. Before the end of this month the company expects to be running at its utmost capacity.

CHICAGO.

Pig Iron Very Strong—Great Activity in All Lines.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, Sept. 7.

Another week has passed in what promises to be the greatest era of industrial activity and progress that this country ever has known. All indications continue to point to the one conclusion, that all records of production and selling are to be surpassed within the next few months, and by a very substantial percentage. This week finds the furnace interests more firmly intrenched than ever in their position, and more settled in their determination not to let go of their products until prices more attractive to the producer are reached. One important southern interest has withdrawn from the pig iron market, for any delivery, either this year or next, while other interests, although they have not taken quite such a radical stand, are not making any effort to sell material at present prices, and are rather pleased than otherwise when an occasional report is heard of some sales for nearby delivery being made at current prices, as it removes just that amount of competition from the expected good times in the near future. This attitude is seen all through the iron and steel trade, and is confirmatory of the optimistic predictions which wise ones have been making for weeks. Heavy business has been the rule of the past week, in almost everything, and this is particularly true with respect to jobbers in iron and steel. These interests are enjoying an era of prosperity which is running at high tide, and their profits, both present and prospective, are most gratifying to them. The higher prices which have prevailed for some weeks have not had the effect of curtailing purchases, but the effect would seem to have been otherwise, for, the sales books of the various companies show that August business was exceedingly heavy, and that September has started out at a pace which bids fair to throw the record of August, large as it is, into the shade. Were it possible to give the actual figures, the showing would be most interesting, and even astounding. With all of the fine prospects which are seen on every hand, there is, as always, another side to the shield. This report, mentioned some two weeks ago, the actual car shortage, which was beginning to be felt. While this has not increased to a very serious extent, there are other unfavorable factors which enter into the equation and disturb the otherwise very hopeful and pleasing prospect. One of these is a scarcity of labor in the rolling mills. A local interest, which is expanding its production by the addition of new equipment, faces a serious situation in the difficulty it is encountering in securing a sufficient number of men to operate the enlarged plant. Whether this will be an experience shared by a large proportion of the manufacturers, remains for the future to determine.

Pig Iron.—The tone in the pig iron market is exceptionally strong, and makers are growing more and more indifferent in the matter of taking on new business, while, on the other hand, buyers are beginning to realize that they already have missed their opportunity to get in at former prices, and are making every effort to buy at a little better than the open market offers them. In most cases, this attempt meets with failure, as furnace men are holding their iron very firm, and they turn a deaf ear to any arguments or pleadings for concessions. The volume of business in the Chicago pig iron market, the past week, has been very heavy, as it was for the month of August. That month passed all previous months in the records of one of the largest sales agencies in this city, which probably is approximately true of most of the factors in pig iron here. A large steel foundry interest was reported to be in the market with an inquiry for from 3,000 to 5,000 tons of basic, but this lacks confirmation. The J. I. Case Threshing Machine Co., of Racine, Wis., is said to have a 2,000-ton inquiry in the market. Small sales of No. 2 foundry, amounting to quite a respectable total, were features of the market the past week, and there was a considerable movement in Lake Superior charcoal iron. The most striking feature, however, was the withdrawal from the market by the Tennessee Coal, Iron & Railroad Co., not only for immediate delivery business, but for next year. This does not necessarily indicate that the company is sold up for either period, but that it is convinced that present prices soon will give place to figures on a much higher level. It is reported from Birmingham that the feeling in that market is very strong, and that $14.50 to $15 is expected to be the ruling spread there before long. Much of the strength in that district is due to the absorption of small lots of speculative iron, which have been the one source from which anything like weakness was desired.

Northern foundry No. 2	18.00 to 18.50
Northern foundry No. 3	17.50 to 18.00
Southern foundry No. 1	18.35 to 18.85
Southern foundry No. 2	17.85 to 18.35
Southern foundry No. 3	17.10 to 17.60
Southern foundry No. 4	16.60 to 17.10
Southern No. 1 soft	18.35 to 18.85
Southern No. 2 soft	17.85 to 18.35
Southern silveries, 4 per cent silicon	18.35 to 18.85
Southern silveries, 5 per cent silicon	18.85 to 19.35
Southern silveries, 6 per cent silicon	19.85 to 20.85
Jackson Co. silveries, 6 per cent.	20.40
Jackson Co. silveries, 8 per cent.	21.40
Jackson Co. silveries, 10 per cent	22.40
Malleable Bessemer	17.50 to 18.00
Standard Bessemer	19.00 to 19.50
Alabama basic	18.35 to 18.85

Billets.—There has been no change to report in this market, and prices and conditions remain as they have been for weeks, the price of $28 being purely nominal. The billet mill at Gary has been running fairly regularly.

Merchant Bars. — There is a very good volume of business being done in merchant bars, but mostly for future delivery, as it is the general condition that mills have nothing to sell for this year. The inquiry for next year is quite heavy. The Inland Steel Co. made 1.58c its minimum price for soft steel bars, but the other interests have not followed that lead. Prices on material out of store have been advanced. Iron bars are selling at a flat price of 1.80c, and steel bars have advanced $1 a ton. The Blue Island Car & Equipment Co. expects to start its 10-inch and 18-inch mills on Monday next. These mills were described in THE IRON TRADE REVIEW of Aug. 19. A preliminary run of the machinery was made today (Tuesday). The company will manufacture bar iron in rounds, flats and squares.

We quote for Chicago delivery, as follows:

Bar iron, 1.45c to 1.50c; hard steel 1.45c to 1.50c; soft steel bars and bands, 1.53c to 1.58c, half extras, soft steel angles, less than 3 x 3, 1.63c to 1.68c, half extras; hoops, 1.63c to 1.68c base, full extras; planished or smooth finished tire steel, 1.63c to 1.68c; iron finish, up to 1½ x ½ inch, 1.63c base, tire card; iron finish, 1½ x ½-inch and larger, 1.43c to 1.48c base, steel card; channel for solid rubber tires, ¾ to 1 inch, 1.93c to 1.98c; and 1⅛ inch and larger, 1.83c to 1.88c; smooth finished machinery steel, 1.73c; flat sleigh shoe, 1.53c; toe calk steel, 2.03c; spring steel, 2.08c; crucible spring steel, 2.58c; tool steel, 7c to 9c, with higher prices for special grades. Quotations on shafting are 60 per cent off the list for carload lots, and 55 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.80c, base, full extras; soft steel bars, 1.75c to 1.85c per 100 pounds base, plus half extras; soft steel hoops, 2.25c, full extras.

Structural Material.—Business con-

tinues good and prices are firmly held. The Lackawanna Steel Co. has made a minimum price of 1.50c, Pittsburg, equivalent to 1.85c, Chicago. Mills seem to have nothing to sell for this year. The volume of actual tonnage booked is not so heavy this week as last, but there is a constant flow of orders and specifications, which do not help to make the position of the fabricating plants any more comfortable than it has been for some time. The general contract for the Sherman House has been awarded to John Griffiths & Son, Chicago, and the 5,000 tons of steel will be placed within the next few days. The Four Courts (Municipal) building, 1,000 tons, St. Louis, has been let to the Brown-Ketcham Iron Works, Indianapolis. The National Realty building, Tacoma, Wash, 877 tons, went to the Des Moines Bridge & Iron Co. The Modern Steel Structural Co., Waukesha, Wis., secured the contract for the building to be erected by the Blyn-Robinson Lumber Co., Los Angeles, Cal. The Whipple Car Co., Chicago, 177 tons, went to the McClintic-Marshall Construction Co.

We quote mill prices for structural shapes, Chicago delivery, as follows:

Beams and channels, 15-inch and under, 1.58c to 1.63c. For extras see Pittsburg report.

Local store prices are as follows:

All angles, 3 inches and larger, including 6 inches, $1.85 per 100 pounds; angles over 6 inches, $1.95 per 100 pounds base; beams, 3 to 15 inches, inclusive, $1.85 per 100 pounds base; channels, 3 inches and larger, $1.85 per 100 pounds base.

Rails and Track Supplies. — This has been another week of heavy purchases of steel rails, both standard section and light. The leading interest sold over 60,000 tons of standard rails to western roads, and practically all of the rails are to be open-hearth. The sales were distributed among a number of railroads, but there was one road which took 30,000 tons. One lot of 20,000 tons is still open. The 60,000 tons mentioned above are for delivery in November, December, January, February and March. The business done by the Corporation, in light rails, in August, was the best for six months. The mill at Gary rolled 40,000 tons of rails last month.

See Pittsburg report for prices on standard sections. On light rails, Chicago delivery, we quote as follows:

Light rails, 40 and 45-pound, $26; 30 and 35-pound, $26.75; 16, 20 and 25-pound $27; 12-pound, $28. In lots of 250 to 500 tons a reduction of 60 cents a ton from these prices is made; lots of 500 tons and up carry a reduction of $1 a ton. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; railroad spikes, 1.75c to 1.85c; smaller size spikes, 1.85c to 1.95c base; track bolts, with square nuts, 2.25c to 2.35c; with hexagon nuts, 2.40c to 2.50c.

Plates.—A continued heavy business is the substance of the reports made by manufacturers in this line. The capacity of the mills is less than the volume of orders being received.

We quote, for Chicago delivery, as follows:

Tank plates, ¼-inch thick; 6¼ to 100 inches, 1.58c to 1.63c. For extras see Pittsburg report. Store quotations are without change, as follows:

Tank steel, ¼-inch and heavier up to 72 inches wide, 1.85c to 1.95c; from 72 inches wide to 96 inches wide, 1.95c to 2.05c; 3/16-inch up to and including 60 inches wide, 1.95c to 2.05c; 72 inches, 2.20c to 2.30c; No. 8 up to 60 inches wide, 2c to 2.10c. Flange and head quality, 25c extra.

Sheets.—Conditions are such that in some cases delivery is not promised until late November or December, with prospects of the latter month seeing the delivery consummated, rather than the earlier month. The Inland Steel Co. has withdrawn all its quotations for the present. Prices on No. 10 gage, out of store, have advanced $2 per ton.

For mill prices see Pittsburg report. Freight to Chicago, 18 cents. We quote store prices at Chicago as follows:

No. 10, 2.20c to 2.30c; No. 12, 2.15c to 2.25c; No. 14, 2.20c to 2.30c; No. 16, 2.30c to 2.40c; Nos. 18-20, 2.50c to 2.60c; Nos. 22-24, 2.55c to 2.65c; No. 26, 2.60c to 2.70c; No. 27, 2.65c to 2.75c; No. 28, 2.75c to 2.85c; No. 30, 3.05c; galvanized sheets, Nos. 10 to 16, 2.90c to 3c; Nos. 18 and 20, 3.05c to 3.15c; Nos. 22 to 24, 3.20c to 3.30c; No. 26, 3.40c to 3.50c; No. 27, 3.60c to 3.70c; No. 28, 3.80c to 3.90c; No. 30, 4.20c to 4.30c.

Merchant Pipe and Tubes.—Business is very good, but, as yet, the expected advance in price has not been made. Mills are behind on deliveries of seamless tubes, but on other deliveries there is no complaint.

Cast Iron Pipe.—A very good routine business is reported, with orders confined to small lots, although there is some business in sight of a larger caliber. The continued hardening in prices of raw materials makes an advance in the price of cast iron pipe, within the next few days, almost a certainty. Prices are unchanged, as follows: Four-inch water pipe, $27.50; 6 to 14 inches, $26.50; larger sizes, $25.50; gas pipe, $1 a ton higher.

Old Material.—The stuation in the scrap iron and steel market remains very strong. Holders of large stocks are not unloading to any great extent and prices in a number of instances are higher.

Old car wheels	$17.00 to 17.50
Old iron rails	19.00 to 19.50
Rerolling rails (4 ft. and over)	16.50 to 16.75
Old steel rails (2 ft. and under)	16.25 to 16.50
Light section relayers, 45 lbs. and under subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	22.50 to 23.50
Frogs, switches and guards	15.00 to 15.50
Heavy melting steel	15.75 to 16.25
Shoveling steel	14.75 to 15.25

We quote, net tons, as follows:

No. 1 R. R. wrought	$15.00 to 15.25
No. 2 R. R. wrought	14.00 to 14.25
Arch bars and transoms	17.75 to 18.00
Knuckles, couplers and springs	14.75 to 15.25
Shafting	16.50 to 17.00
Iron car axles	20.50 to 20.75
Steel car axles	19.00 to 19.25
Locomotive tires	15.50 to 15.75
Dealers' forge	12.50 to 12.75
Pipes and flues	11.00 to 11.25
No. 1 cast, 150 lbs. and less	14.25 to 14.50
No. 1 busheling	12.50 to 13.00
No. 2 busheling	9.00 to 9.25
No. 1 boiler cut	10.75 to 11.25
Boiler punchings	13.75 to 14.00
Cast and mixed borings	6.50 to 6.75
Machine shop turnings	9.25 to 9.75
Railroad malleable	14.50 to 15.00
Agricultural malleable	12.25 to 12.75
Stove plate and light-cast scrap	12.00 to 12.25
Angle bars, splices, etc. (iron)	17.50 to 18.00

NEW YORK.

Active Inquiry for Pig Iron for First Half of Next Year.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Sept. 7.

Iron Ore.—The most interesting development of the week has been the announcement that about 500,000 tons of Swedish ore will be offered to American furnaces for shipment during 1910. It also develops that the tonnage taken by the two steel works controlling the Cuban properties will be heavier than heretofore estimated, and other foreign sources will probably bring the total importations up to over 3,000,000 tons. This, with the increased output of New York, New Jersey and Pennsylvania mines, will supply Eastern furnaces to such an extent that very little purchasing of Lake ores is anticipated. The eastern situation is discussed in detail elsewhere in this issue.

Pig Iron.—Inquiry for the first half of 1910 has now become quite general, and the first week of the present month has witnessed considerable buying for that period. Two or three very large blocks of foundry iron have been closed, one selling interest reporting sales of 40,000 tons. The New England district is also more active and several good orders have been placed, among them being two lots of 3,000 tons each, with num-

erous small orders at the higher prices now ruling. One interest reports the average price paid for iron during August in the Boston territory as $1.52 higher than the average for July; the prediction is made that September average will exceed that of August by at least 50 cents. Throughout the East, there is a marked scarcity of low grade iron, as a result of which Virginia makers have marked up prices to the same level as that prevailing on the higher grades. The Virginia Iron, Coal & Coke Co. is running two furnaces and has reduced its stocks to some extent. Buffalo furnaces are holding at $16.00 for prompt iron and $16.25 for first half. The larger producers in Eastern Pennsylvania are quoting from $17.00 to $17.25, furnace, for the remainder of this year, with a premium of 50 cents for first half. We note the sale of a considerable tonnage of foundry coke at $2.50, oven, for the rest of this year and $2.65 for the first quarter. Furnace coke is quoted at $2.25 to $2.30, ovens. We quote, New York delivery during this year, as follows:

Northern foundry No. 1	$18.25 to 18.75
No. 2X foundry	17.75 to 18.25
No. 2 plain	17.25 to 17.75
No. 2 southern foundry	17.50 to 18.00
Malleable	18.00 to 18.50
Gray forge	16.75 to 17.25

Ferro-Alloys.—No material change in prices is noted from those reported a week ago and current selling is rather light, although several interests are sounding the market in a way that may develop orders in the near future. It is reported on good authority that Corporation subsidiaries have bought heavily of ferro-silicon and ferro-manganese, one report placing purchases of the order at 4,500 tons. The same interest recently entered the market for 600 tons of ferro-phosphorus. We quote ferro-manganese at $42, seaboard, for prompt, $44 for first quarter and $45 for first half. For 50 per cent ferro-silicon, the rulling figure is $1.55, Pittsburg.

Finished Materials.—According to an authority in exceedingly close touch with the structural steel trade throughout the country, the New York and Philadelphia district has shown the smallest advance in fabricated steel prices, being on an average only about $3.00 per ton higher than three months ago, whereas the Chicago territory has had an average increase of about $10.00 per ton and the Pittsburg district has also made a marked improvement. August bookings of the American Bridge Co. are announced as about 32,000 tons, exclusive of the Westchester contract which was not entered during the month. The placing of an order for 1,000 tons of punched Bethlehem beams for a spinning mill at New Bedford directs attention to the heavy call for steel resulting from improvements to the New England cotton mills during the past year; it is stated that fully 25,000 tons has been purchased during the summer. Local structural lettings have been rather few of late. Ravitch Bros. have taken a Bing & Bing apartment house on 110th street, requiring a total of 1,200 tons, of which 500 tons will be Bethlehem girders and columns, and about 200 tons of this material will go into another apartment on 156th street for which Ravitch Bros. also have the contract. A. E. Norton & Co. have a 900-ton apartment for the Carlisle Realty Co. and the Hinkle Iron Works another of the same tonnage for Chickering & Walker. The Pennsylvania Steel Co. will supply 600 tons for a connection at Thirty-second street for the Hudson-Manhattan Railway Co. The Department of Docks and Ferries will shortly be in the market for 1,200 tons for Pier Shed 31 in South Brooklyn and 900 tons for a trolley viaduct at St. George, S. I. An inquiry is pending for a Chinese single track bridge consisting of ten 100-foot spans and four 200-foot spans. An early decision is expected on 800 tons for railway bridges over the Cape Cod Canal and the highway bridges, involving a smaller tonnage will be out some six weeks later. A saw mill at New Orleans, requiring 400 tons of steel, went to the Bedell Structural Steel Co., the Decatur Bridge Co. took the Woodruff building at Joliet, 450 tons, and the Minneapolis Steel & Machinery Co. will supply 2,800 tons, chiefly Bethlehem sections, for a bank building at Spokane.

The Milwaukee Electric Railway has ordered 2,500 tons of rails from the Pennsylvania Steel Co. and a Maine road has bought 250 tons. Billets are increasingly scarce and command good premiums. A leading maker places the market at $26 to $27 mill for plain Bessemer billets, but adds that it has nothing to offer even at this price. Arrangements are being made for increasing the output at certain points to catch up on deliveries. Another mill has adopted a new contract form, reserving the privilege of cancellation in case tonnage is unspecified for two consecutive months. Bar iron is in slightly better demand and is selling at 1.45c mill, equivalent to 1.55c New York. We quote:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.56c to 1.61c; beams 3 to 15 inches, 1.56c to 1.61c; tees, 3 x ¼-inch and heavier, 1.56c to 1.61c; plates, carloads, tank, 1.56c to 1.61c; marine boiler, 1.86; bar iron, 1.55c; soft steel bars, 1.51c to 1.56c; sheets, No. 28, black 2.56c.

Old Materials.—Bar iron mills are inquiring for moderate tonnages somewhat more freely than has been the rule and considerable buying of wrought scrap, light iron, pipe and similar materials is being done as the result. There is no material change in prices and the situation otherwise remains the same. We quote, gross tons, New York delivery, as follows:

Old steel rails (rerolling)	$15.00 to 15.50
Relaying rails	19.00 to 19.50
Old car wheels	14.50 to 15.00
Old iron car axles	22.00 to 23.00
Old steel car axles	20.00 to 20.50
Heavy melting steel	14.50 to 15.00
No. 1 railroad wrought	16.50 to 17.00
Iron track scrap	14.50 to 15.00
Wrought pipe	14.00 to 14.50
Cast borings	9.50 to 10.00
Wrought turnings	11.00 to 11.50
Heavy cast scrap	13.00 to 13.50
Railroad malleable	13.00 to 13.50
Stove plate	11.50 to 12.00
Grate bars	11.00 to 11.50

ST. LOUIS.

Prices of Southern Pig Iron Advancing—Inquiry for Basic.

Sept. 7.

Pig Iron.—One inquiry is out in the St. Louis territory for 5,000 tons of basic for shipment over the last three months of 1909, and another is pending for 7,000 tons of different grades of iron for delivery over the first quarter of next year. This probably will be placed within the next 48 hours. Upwards of 6,000 tons of southern iron were sold in the St. Louis territory last week for delivery over the first half of 1910, of which 2,000 tons was disposed of by one company. Prices on southern iron are decidedly stronger, very little, if any, being offered for quick shipment at less than $13.50, sales having been recorded last week at $14 for immediate shipment and delivery over the last quarter. Some of the furnaces have withdrawn for first quarter and first half delivery. Ohio foundry iron is higher, one furnace having withdrawn from the market, having sold up its product and about one-half of the next six months. Ohio foundry is firm at $15.75 to $16, Ironton, with one of the large car concerns asking for prices on malleable Bessemer for shipment over the remainder of the year.

Our prices, delivered, to which the Birmingham freight of $3.75 has been added, follow:

No. 1 southern	$17.25 to 17.75
No. 2 southern	16.75 to 17.25
No. 3 southern	16.25 to 16.75
No. 4 southern	15.75 to 16.00

Coke.—The best contract price for Connellsville 72-hour foundry coke for delivery over the remainder of the year is $2.40 to $2.50, and $2.50 to $2.60 for next year's shipment. The market is advancing. There is not much demand for furnace coke in the St. Louis market, but prices are stiff, and quotations are about the same as on foundry grades. Virginia and West Virginia coke is offered at $2.35 to $2.40 for immediate shipment, $2.50 for delivery over the remainder of the year, and $2.50 to $2.75 for first quarter and first half of the next year. The freight rate to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis. By-product coke is selling at $5 for furnace grades and $5.25 for foundry grades.

Old Material.—The market for scrap iron is stiffening, with quotations as follows:

Cast iron borings, free from foreign material, net tons	$ 5.50 to 6.25
Steel axle turnings, gross tons	11.00 to 12.00
Steel railroad axles, net tons	18.00 to 19.00
Iron railroad axles, net tons	20.00 to 21.00
Miscellaneous steel scrap, gross tons	11.00 to 12.00
Old car wheels, gross tons	15.50 to 16.50
No. 1 railroad cast scrap, net tons	12.50 to 13.50
Heavy machinery cast, net tons	14.00 to 14.25
Stove plate and light cast, net tons	10.00 to 11.00
Sheet iron, net tons, uncut	5.00 to 5.50
No. 1 railroad wrought, net tons	13.00 to 13.50
Railroad malleable net tons	13.00 to 13.50
Heavy melting steel, net tons	12.00 to 13.00
Relaying rails, net tons	18.00 to 19.00
Extra heavy cast, regular breaking	12.00 to 13.00
Railroad grate bars (eng)	10.50 to 11.00

BRITISH IRON AND STEEL.

Remarkable Improvement in Finished Material.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Aug. 27.

Pig Iron.—The improvement noted last week in pig iron is much more pronounced today, so that the tone is distinctly buoyant. This week 52s ($12.72) for Cleveland pig iron has been reached for forward buying, which is 2s above the selling figure at the commencement of the month and 5s 4d above the minimum of the present year, which was reached about the middle of March. A peculiar feature is that stocks continue to increase, the amount in store being 280,265 tons, an increase on the month of 21,094 tons. Apparently, this has no effect upon prices, and it is remembered that within the past few years the stocks have reached three times this tonnage. Shipments are fairly active, 89,912 tons having been sent away in August compared with 70,881 tons last month. Practically all the blast furnaces in the Midland district are booked up to the end of the year, and some, if they were so disposed, could take contracts into next year. but they are not eager in this direction. The most marked improvement is in respect of hematite, the bookings in the Cleveland district reaching 30,000 tons. Sellers have realized 57s 6d ($14.08) for early delivery up to 60s ($14.20) to the end of the year. The demand for foundry iron has improved mainly on account of greater animation in the engineering trade. The demand in the Barrow district is comparatively quiet and is well within the capacity of the 26 furnaces in operation. Owing to the more cheerful outlook in steel, a busy autumn is anticipated.

Finished Material.—The past week has been remarkable for the extent to which the trade improvement has been manifest in the finished iron trade. Owing to heavy bookings, the Scotish iron masters on Wednesday withdrew from the market for ordinary iron brands and hematite. Many steel makers are also out of the market for ship plates, having booked their full output for three months. There is more doing in structural work, but the improvement here is much less marked. Quite a number of new orders for ships have been placed lately. The Birmingham iron market on Thursday showed the first real improvement in finished iron prices. Some makers declared a minimum of £6 per ton for unmarked iron, while others asked £6 5s, but there were still firms willing to take lower figures. A fair amount of cheap German and Belgian material is still being imported, even into this iron district.

There is some improvement in galvanized sheets which are no longer obtainable at £10 10s, the minimum being £11, while the best houses are getting £11 10s, and there is plenty of trade. Some big orders have been placed for billets and bars, prices of which are 5s better than they were three weeks ago. A good deal of warehouse stocking is also going on.

Every day brings news of big orders for iron and steel. The Blake Boiler, Wagon & Engineering Co. of Darlington has booked a contract for 500 40-ton all-steel bogie freight wagons for the Buenos Ayres Western Railway Co. This is a railway 1,300 miles long in the grain producing area of Argentine. The wagons are each 35 feet long and 10 feet 9 inches wide, while the height inside will be 8 feet 6 inches. The under frame will be built entirely of mild steel. The order is a substantial one, insuring active work for this company for 12 months at least.

Another typically large order is for guns and gun mountings, costing something like a million pounds, which has been placed with the Coventry Ordnance Co. This firm is employing 1,500 additional hands, and will be busy throughout the whole of next year.

METAL MARKETS.

ST. LOUIS.

Sept. 7.

Lead and Zinc.—Ore sold in the Missouri-Kansas-Oklahoma district last week on a base price of $48.50 and $49, thus falling below the base price of the previous week of $50.

The price of lead dropped from $60 to $58.50, with large quantities of lead remaining unsold. The spelter market in St. Louis also was 10 cents lower than at the close of the preceding week.

The decline in ores was registered despite the efforts of producers to maintain the base price of the previous week and the consequent tendency of some smelter representatives to take advantage of the least drop in prices. It is contended by many producers whose mills are operated to the full capacity that conditions justify them in refusing to let go of their ore holdings, but on the other hand surpluses have accumulated in certain portions of the districts to the extent that miners are anxious to dispose of their ores. The general belief is that better figures will be obtainable before the close of the present week.

CHICAGO.

Sept. 7.

New Metals.—There has been a fair volume of business in the metal market with a somewhat larger trade in copper than last week. The monthly report of the copper producers, which will be made public on Sept. 10, will show, it is expected, an increase in stocks on hand. This may have a tendency to check any advance in prices, for the present at least, which the active business conditions might otherwise bring about. We quote as follows:

Lake copper, carload lots, 13⅝c to 13¾c; casting copper, 13¼c; smaller lots, ¼c to ¾c higher. Spelter, 5.80c to 5.85c; lead, desilverized, 4.45c to 4.50c in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $7.50 list f. o. b. LaSalle in car lots of 600-pound casks; pig tin, 31¾c to 32¼c; Cookson's antimony, 10½c; other grades, 9¾c to 10¼c.

Old Metals.—Business has been very

quiet the past week in the line of old metals. What trading there has been, has been done on the old scale of prices. We quote dealers' selling prices, as follows:

Copper wire, 13¼c; heavy copper, 13c; light copper, 11½c; heavy red brass, 12c; heavy yellow brass, 9½c; light brass, 6¾c; No. 1 red brass borings, 10c; No. 1 yellow brass borings, 7¾c; brass clippings, 9½c; tea lead, 3.60c; lead scrap, 4c; zinc, 4½c; tin pipe, 29c; tin foil, 27c; pewter 20c; electrotype plates, free from wood, 4¼c; electrotype dross, 2.75c; stereotype plates, 4½c; stereotype dross, 3¼c; prime slab zinc dross, $70 per ton.

NEW YORK.

Sept. 7.

Copper.—The market has shown little activity during the past week and prices have shown little change, although some of the larger selling interests have announced a slight advance and this is being nominally adhered to. There are persistent reports that considerable re-selling of prompt metal is being done both in Europe and this country. Current quotations are as follows: Lake, 13¼c to 13½c; electrolytic, 13c to 13¼c; casting, 12⅞c to 13c.

Pig Tin.—The situation is stronger, following the announcement that August statistics show a decrease of 600 tons. Prices, however, do not reflect this condition and continue within the range of 30⅛c to 30¼c.

Pig Lead.—The tone of the market is easier because there is no movement of large lots. Prompt delivery metal is quoted at 4.32½c to 4.35c.

Spelter.—There is little activity on the part of consumers and some speculative selling is being done. Current quotations are 5.65c to 5.75c New York.

Antimony.—We quote: Cookson's, 8⅝c; U. S., 8c; outside brands, 7½c to 7¾c.

RUMOR OF IMPORTATIONS NOT CONFIRMED.

(Special Telegram.)

New York, Sept. 8.—The reported purchase of 40,000 tons of German pig iron can not be confirmed. British iron cannot be sent to this country today by a margin of perhaps 50 or 75 cents; neither can it be sent to Germany, hence it is unlikely that German iron can be sent here. Possibly this tonnage is for the Pacific coast.

RECORD ORE SHIPMENT

Was Made in August—Congestion of Vessels in Lower Lake Ports.

The double holiday at the lower lake ports has caused considerable congestion of vessels, especially so as the upper lake docks worked both Sunday and Labor day. It will take at least a week to return to normal conditions on Lake Erie. Carriers are crowded badly at all ports and some extraordinary shifts are being made, as for instance sending a vessel from Cleveland to Buffalo to unload. Obviously this condition entails a serious loss of time. Many of the vessels will have to return light to the head of the lakes for, while coal is moving quite freely, it is not moving fast enough to supply this sudden increase in tonnage.

The ore movement during August established a record, exceeding 7,000,000 tons for the first time in the history of the business. In fact not until 1890 were 7,000,000 tons moved in any one year on the lakes. The exact figures for August are 7,193,199 tons. The fleet has moved 22,588,549 tons up to Sept. 1, which is only 1,753,003 tons less than the corresponding movement during 1907. It is clear that the 1907 record can easily be equaled and probably will be, as shippers appear to be anxious to move all the ore possible. Following are the ore figures tabulated to Sept. 1 for the past three years:

ORE SHIPMENTS.

Port.	Aug 1909.	Aug.1908.	Aug.1907.
Escanaba	1,037,341	597,220	918,286
Marquette	542,607	279,610	574,659
Ashland	639,581	444,246	607,653
Superior	1,110,213	611,321	1,334,790
Duluth	2,279 242	1,764,053	2,051,280
Two Harbors	1,584,215	1,053,205	1,320,143
Total	7,193 199	4,749,655	6,806,811

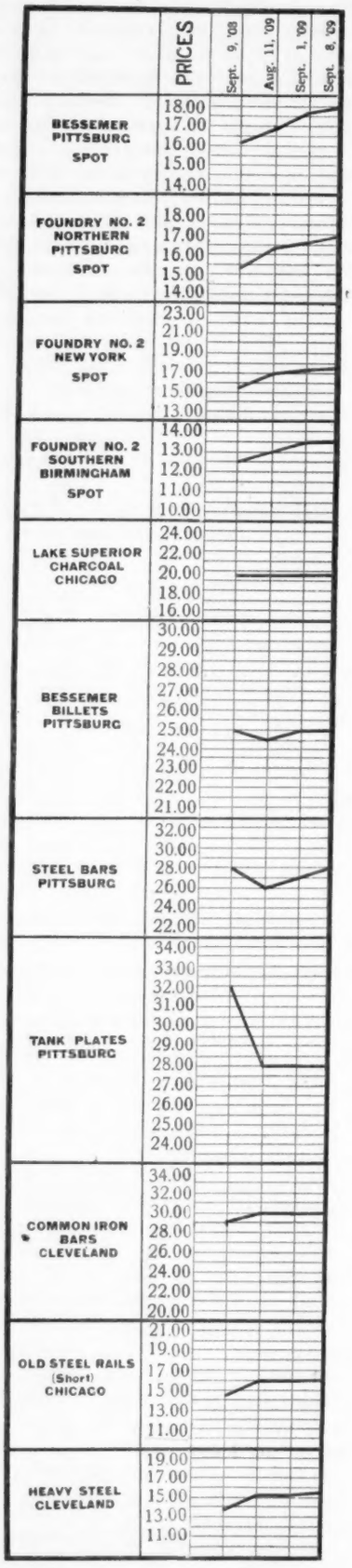
1909 increase, 2,443,544 tons, or 51.45%.

	To Sept. 1, 1909.	To Sept. 1, 1908.	To Sept. 1, 1907.
Escanaba	3,053 845	1,351,513	3,731,165
Marquette	1,413,568	625,399	1,924,464
Ashland	1,700 769	1,037.185	2,314,760
Superior	3,686,323	1,723 208	4,416 454
Duluth	7,713,377	4,583.987	7,202,645
Two Harbors	5,020,667	2.663,644	4 752,064
Total	22 588,549	11,984,936	24,341,552

1909 increase, 10,603,613 tons, or 88.48%.

There is abundant evidence that lake ship builders will have a prosperous winter. James C. Wallace, president of the American Ship Building Co., closed contracts last week for four bulk freighters. The names of the contracting parties are at present withheld, but they are all for independent interests. Announcement of contracts for vessels for some of the steel making companies may shortly be expected. Thirteen vessels have so far been contracted for for 1910 delivery.

PRICE CHART.



HEAVY IMPORTATIONS OF SWEDISH ORE

Will Form an Important Addition to the Large Shipments From Foreign Lands Recently Announced—Decreased Use of Lake Superior Ores.

Although the situation of eastern furnaces as regards their 1910 ore supply is still liable to considerable change during the intervening four months, matters have progressed sufficiently far to warrant two important predictions. (1) The importation movement will easily double and may treble that of the previous record year. (2) Eastern furnaces will purchase very little lake ore, relying almost entirely on imported ores and those mined in New York, New Jersey and Pennsylvania.

The most important development of the past week has been the announcement that a large block of Swedish ore will be available for American use next year. This will be at least 400,000 tons, and more likely, according to the selling representative will run up to 500,000 tons; but in previous estimates of probable importations has been left out of consideration because of the report that German consumers had bought so heavily as to shut off further shipments across the Atlantic. This ore has a very high iron content, with phosphorus varying in different parts of the workings, and is cheaply mined. During the present year the Reading Iron Co. is using it to the extent of over 100,000 tons, and five other eastern furnaces are taking a total of 100,000 tons additional. Shipments are from Narvik, Norway, and Lulea, Sweden. From the latter port, which is closed by ice in winter, the distance to Philadelphia is about 4,000 miles. The course from Narvik is shorter and this port, although well north of the Arctic circle, is open through the winter because of ocean currents. The Kirunavara Co., which is the principal miner, has a fleet of seven vessels averaging 4,500 tons burden.

The Spanish ore movement also promises a considerable increase beyond the 400,000 tons already sold by Sota & Aznar for 1910 shipment. A Philadelphia importing interest is offering a block of 50,000 tons of choice Spanish ore, and other lots of Spanish Grecian product will probably raise this total to 200,000 tons. At present it seems unlikely that Russian ores will come over in any large quantities, owing to the high price of those grades free from excessive fines and the heavy freights incident to the great distance. Current chartering for the Spanish ore movement is on the basis of 8s 3d.

It is also evident that previous estimates of the ore importation movement from Cuba during 1910 were much too low, as the total now promises to reach 1,800,000 tons. One of the steel companies owning these workings is counting on bringing in ore at the rate of 100,000 tons per month and the other will need at least half that amount. There will be no Cuban ore offered to merchant furnaces. This means that the total foreign ore available for eastern furnaces during the coming calendar year, as nearly as can be estimated at present is 3,150,000 tons, from the following sources:

	Tons.
Cuba (to steel works)	1,800,000
Sweden	500,000
Newfoundland	250,000
Spain	500,000
Greece and miscellaneous	100,000
Total	3,150,000

The cause for this sharp increase in foreign offerings and sales is found in the efforts of eastern furnace men to secure their ore supplies at a lower unit cost than is possible with lake ores at the current schedule of prices. The cheapest lake ore, Mesabi non-Bessemer, costs an average of 9.6c per unit delivered at eastern Pennsylvania furnaces. This is fully one cent per unit higher than Spanish ore delivered at these same plants, which to certain well located furnaces can be put in as low as 8.45c per unit. The other foreign ores being brought in make an equally favorable showing. There has been some scattered buying of lake ores in this territory of late, but only of material varying from the standard analysis sufficiently to secure a generous price concession.

Aside from the certain increase in ore importations, eastern miners during the coming year will offer much larger tonnages than ever before. The Port Henry workings have been put in shape for record operations, the Cornwall mines have been considerably improved, the Benson mines will soon be in shape to ship 500 tons per day, the new Salisbury workings will yield perhaps twice that amount, and other ore fields serving eastern furnaces have been put in position for largely increased yields. These ores are also available at prices well under those at which lake ores can be delivered. As yet there has been no selling of importance for shipment later than Jan. 1, as no large producers have opened their books. Eastern furnace men believe these sources offer a sufficient tonnage for their probable needs and, excepting such purchasing as is always done to fill special requirements, there is every reason to predict that the coming year will see these iron makers operating practically independently of the lake supply. The report has been current in the east of late that lake ore prices for next year will be 50 cents higher than at present.

MORE MEN

Needed on the Iron Ranges—Woodbridge Will Be a Producer Next Year.

Republic, Mich., Sept. 6.—While great activity in mining and shipping prevails in the Lake Superior iron country generally, the operations on the Mesabi range are being conducted with particular vigor. The work there is on a truly tremendous scale, and it needs to be, for from the Mesabi must come materially more than half of the ore demanded from the entire region. Not only is the Mesabi breaking all former records of production this season, but it is preparing for still greater things in the year to come. More mines will be on the shipping list in 1910 than ever before.

In the Eveleth district, work is in progress preliminary to opening a new open-cut mine for Pickands, Mather & Co. in Section 30, 58-17.

Another new Mesabi producer next year will be Oglebay, Norton & Co.'s Woodbridge mine, near Buhl, recently purchased for the Algoma Steel Co. It will be an underground proposition, part Bessemer and part non-Bessemer. Development work is in progress.

The Pittsburg Iron Ore Co. is preparing to resume mining operations at the Nassau property, northeast of Hibbing. The workings are now being unwatered. The Nassau has been idle the past two years. The great majority of the Steel corporation's Mesabi mines are shipping heavily, and in addition vast stripping work is being done. The development of the Hill lands in the vicinity of Calumet and Marble, at the western end of the range, is being pushed and a very considerable production will

come from that territory the coming season. At the Jones & Laughlin Steel Co.'s Grant mine at Buhl, where the grab and clamshell system was given an unsuccessful test of several years' duration, the overburden is now being stripped in the usual manner.

A new shipper on the Vermilion range next year will be the Section Thirty property, known also as the Shagawa. Railroad facilities are to be provided during the winter. From all accounts, the Section Thirty is now developing into the valuable proposition it has long been supposed to be. Some fine Bessemer ore is being taken out and the stockpiles are attaining large proportions. Section Thirty has been in many different hands the past decade or more, and a very large amount of money has been expended in its exploitation. George A. St. Clair, Duluth, is directing the present operations, and associated with him in the control of the property is Alfred Merritt, Duluth. A prospective producer is the property of the Vermilion Steel & Iron Co., in Section 5, 62-14. It is reported that sufficient high grade ore has been found to warrant the sinking of a shaft.

Marquette range operators are still complaining of a dearth of labor. Because of the shortage of men, M. A. Hanna & Co.'s Richmond mine, in the Cascade district, will perhaps be obliged to discontinue its night shift. A force of 100 is employed, but double that number is wanted. One hundred more men are urgently needed at the Breitung Co.'s Mary Charlotte mine at Negaunee, and fifty or more are wanted at the same operator's Baron property at Humboldt. The Cleveland Cliffs Iron Co. has doubled the working forces at both the Negaunee and Cleveland Lake mines, each of which is now employing upwards of 500 men, and places are open for still more miners. M. A. Hanna & Co.'s American mine, west of Ishpeming, also is short-handed. Railroad switching and steam shovel crews are working overtime. Similar conditions prevail on the Menominee and the Gogebic.

NEW BRASS FOUNDRY.

Huehl & Schmid, architects, Chicago, have prepared plans for a building, 169 x 162, one story, for the Hancock Mfg. Co., Charlotte, Mich. The company manufactures brass goods. The new building is to have steel columns and steel roof trusses. The architects have completed their plans and the contract will be let in a few days.

WILL RECONSTRUCT COKE PLANT.

It has been announced by David T. Croxton, president of the Cleveland Furnace Co. that a contract has just been closed with the Semet-Solvay Co., Syracuse, for the reconstruction of the company's present coke plant. This plant was built six years ago by the Retort Coke Oven Co., and upon the dissolution of this concern about a year ago, was purchased by the Cleveland Furnace Co. The fact that the plant was only partially successful in operation is largely responsible for the changes about to be made.

Semet-Solvay ovens will be installed with an approximate total capacity of 500 tons per day, which is about one-half the amount of coke required by the company. Tar, ammonia and coal gas will be recovered as by-products, the surplus gas production amounting to 3,000,000 cubic feet per day. Although no provision has been made for the utilization of this gas, it will be easily disposed of, as it is claimed to be a good illuminant.

The reconstruction of the plant will take four or five months and about 200 or 300 men will be required for its operation when completed.

IRON AND STEEL INSTITUTE MEETING.

Programs for the London meeting of the Iron and Steel Institute have reached this country. The meeting will continue for five days, beginning Sept. 27 and will be devoted to the reading and discussion of papers at the morning sessions, visits to points of interest in the afternoons and social events in the evenings. The papers to be discussed are as follows:

"On the determination of the power consumption of reversing rolling mills," C. A. Ablett, London; "On comparative tests of cast iron," E. Adamson, Sheffield; "On artificial magnetic oxide of iron", F. J. R. Carulla, Derby; "On action of air and steam on pure iron" and "On corrosion of iron," J Newton Friend, Ph. D., Darlington; "On uniform moisture in blast," Greville Jones, Middlesbrough; "On the refining of steel by electricity", Disponent E. J. Ljungberg, Falun, Sweden; "On the fuel economy of dry blasts as indicated by calculations from empirical data," R. S. Moore, London; "On the 'growth' of cast irons after repeated heatings", Prof. H. F. Rugan, Tulane University, New Orleans, and Dr. H. C. H. Carpenter, M. A., Manchester; "On the maintenance and renewal of permanent way," R. Price-Williams, London; "On the constitution of carbon-tungsten steels," T. Swinden, B. Met., Sheffield.

The same program announces the international congress of mining, metallurgy, applied mechanics and practical geology at Düsseldorf under the auspices of the Rhennish-Westphalian Mining Industry during the last week of June, 1910.

AMERICAN LOCOMOTIVE CO.'S ANNUAL REPORT.

The annual report of the American Locomotive Co. for the year ending June 30 shows that the company's earnings were only about half of those for the year before, with a resulting deficit of $763,000. A reduction of operating expenses as far as possible and the cessation of dividends on the common stock helped to keep this figure down. The surplus the year before was $2,776,000. Some of the figures in the earning account, as shown by the annual report, follow:

Gross earnings, $19,008,634, decrease $18,831,783; manufacturing, maintenance and administration, $17,665,962, decrease $14,831,665; net $1,342,672, decrease $3,644,118. From the net income is deducted interest on bonds, etc., $355,532, leaving $987,140 available to pay preferred dividends amounting to $1,750,000.

In commenting upon the report, President W. W. Marshall says that the output of the company was at times only about 17 per cent of the normal owing to the hard times, but that work was taken at the smallest possible profit in order to keep the organization intact, and he refers to these facts as explaining the large percentage of expenses to gross earnings.

Advantage was taken of the period of inactivity to install betterments which, with the purchase of land at Gary, cost the company $816,587. Plans have been prepared and contracts let for extensive improvements at Schenectady, Dunkirk, Pittsburg and Richmond. This, it is stated, will result in a large increase in capacity, even after the elimination of smaller and less economical plants, which the company contemplates. The Rogers works at Paterson, N. J., is to take all of the business in the manufacture of contractors' locomotives and steam shovels now done at the Richmond and Scranton plants, and will be used exclusively for that line. The work thus outlined will cost the company $3,500,000.

The Sheridan, Pa., furnace of the Berkshire Iron Works, was blown in Aug. 20.

Rapidly Nears Record Output

The total pig iron production in August was 2,232,642 tons, according to our complete blast furnace returns. This tonnage shows an increase of 144,022 tons over the July production, or 6.8 per cent. The average daily production for August was 72,020 tons compared with 67,375 tons in July, both months having the same number of working days. The merchant pig iron produced was 642,864 tons in August, an increase of 61,697 tons over July. The non-merchant or steel-making iron produced in August was 1,565,142 tons, an increase of 77,844 tons over July. The production of ferro, all states, was 5,971 tons, a falling off of 5,432 tons compared with July. The tonnage of spiegel, all states, in August was 18,665 tons, an increase of 9,913 tons compared with that of the preceding month.

MONTHLY PRODUCTION.

	1909.	1908.	1907.
January	1,787,473	1,043,374	2,194,801
February	1,682,470	1,086,809	2,047,036
March	1,822,024	1,229,856	2,216,709
April	1,731,406	1,155,122	2,226,708
May	1,866,757	1,168,002	2,291,030
June	1,929,929	1,106,300	2,237,420
July	2,088,620	1,228,604	2,253,243
August	2,232,642	1,366,019	2,243,656
September		1,416,252	2,174,148
October		1,573,824	2,359,690
November		1,582,314	1,820,558
December		1,723,664	1,234,733
Total	15,141,321	15,680,140	25,299,732

The total number of blast furnaces in active operation on the last day of the month was 278, an increase of active stacks of 20 for August. The merchant stacks made a larger proportionate gain in the number added to the active list in August than in July. Pennsylvania showed the largest increase in active stacks, 8; Ohio, 4; Illinois and Tennessee, 2 each; Alabama, Virginia, New York and Maryland, one each. Each of the various states and groups of states displayed increases in production during August with the single exception of Illinois. In the last named state the merchant production increased 1,047 tons while the non-merchant tonnage decreased 7,145 tons.

Comparison with large production months of the past, discloses the fact that the August tonnage was only excelled by that of the months of May, June, July and August, 1907. The production for the month just passed of all kinds of pig iron showed a percentage of 65.0 of the total output theoretically possible to be made by all the blast furnaces of the country. This is an increase of 4.3 per cent over the possibility percentage for July, and an increase of 7.1 per cent over that for June.

AVERAGE DAILY PRODUCTION.

	1909.	1908.
January	57,654	34 316
February	60,051	37,476
March	58,775	39,672
April	57,788	38,504
May	60,218	37,677
June	64,331	36 876
July	67,375	39,632
August	72 020	44,065
September	.....	47,208
October	.....	50,764
November	.....	52,744
December	.....	55,602

NEW MILL CONTRACTS.

The United Engineering & Foundry Co., Pittsburg, has secured the contract for a new 14-inch continuous mill for the National Tube Co., Lorain plant, and closed for 12 stands of 28-inch hot mills and four stands of 24-inch cold mills with the Inland Steel Co. The latter order includes squaring shears, sheet levelers and roll lathe equipment. The first shipment on the new Morgan continuous mill for the Cambria Steel Co., Johnstown, Pa., has also been made by the United Engineering & Foundry Co. The company will also build an all-steel shear to cut 6 x 6 cold billets for the Illinois Steel Co. plant at Milwaukee. This shear will be belt driven, motor to fly wheel. The complete new warehouse equipment for the Scully Iron & Steel Co. will also be built by the company.

LARGE INQUIRY FOR SPIEGELEISEN.

Pittsburg, Sept. 8.—Two sales of 3,000 and 1,000 tons of basic iron have been reported on basis of $15.75, valley furnace, for fourth quarter shipment. It is reliably reported that a large Philadelphia importing house has made inquiry for 40,000 tons of spiegeleisen to be purchased from foreign makers.

Injunction Granted.—An injunction, strong in its provisions, was granted Monday by Judge G. F. Robinson of the court of common pleas at Youngstown, O., against half a hundred strikers formerly employed by the American Sheet & Tin Plate Co. at its Struthers, O., mills. The injunction shuts off all manner of intimidation, interference or molestation by strikers of the independent workingmen with whom the plant is now manned either in the mills, on the streets of the village, at their homes, or even on the suburban electric railway property. Conservative observers express the belief that this injunction will tend strongly toward ending the strike. Considerable disturbance, including some cases of shooting, has characterized the Struthers situation of late.

AUGUST FURNACE REPORT.

STATES.	NO. OF STACKS.	NO. IN BLAST ON LAST DAY OF MONTH. AUG.	JULY.	PERCENTAGE OF TOTAL POSSIBLE OUTPUT MADE.	AV. DAILY CAPACITY IN BLAST LAST DAY OF MONTH.	ACTUAL TONNAGE MAKE. MERCHANT.	NON-MERCHANT.	TOTALS. AUG.	JULY.
Pennsylvania	155	118	110	73.2	31,919.0	205,454	730 208	935 662	903,041
Ohio	67	50	46	71.9	16,405.0	119,124	369,031	488,155	459,394
Alabama	46	22	21	47.8	4,430 8	107 553	29,810	137,363	104.775
Virginia	24	12	11	48.7	1.246.8	37 749	———	37,749	33,220
New York	26	19	18	70.2	5,736.1	71,395	99,509	170,904	149,690
New Jersey	9	4	4	44.4	734.0	22 764	———	22,764	19 002
Illinois	26	21	19	74.8	7,704.9	17,359	197.620	214,979	221,077
Tennessee	18	10	8						
West Virginia	4	3	3	44.2	1,821.4	27,334	24,466	51,800	44,685
Kentucky	7	1	1						
Maryland	4	3	2						
Wisconsin	6	3	3	66.3	4,158.0	13,823	114,498	128 321	120,237
Colorado	6	3	3						
Indiana	5	5	5						
Georgia	2	0	0						
Texas	3	0	0						
Minnesota	1	1	1	44.4	654.8	20,309	———	20,309	16,344
Michigan	2	2	2						
Missouri	1	1	1						
Spiegel—All states								18 665	8,752
Ferro—All states								5,971	11 403
Total	412	278	258	65.0	74 726.4	642,864	1.565,142	2,232,642	2,088,620

STRIKE SETTLED.

And Employes of Pressed Steel Car Co. Will Return to Work.

Pittsburg, Sept. 8.—After eight weeks of bitter struggle, the strike at the McKees Rocks plant of the Pressed Steel Car Co. will be officially declared off some time this afternoon. The vote by which this end came about was taken at Indian Mound, the outdoor meeting place of the strikers yesterday afternoon, but the official vote by ballot is being taken today. The open-air vote was overwhelmingly in favor of returning to work under the new terms conceded by the company. While no official statement has been given out, the following conditions, all of them causes of the strike, are believed to have been granted:

The 1907 wage scale, calling for an advance of from 10 to 15 per cent in the present wages, will be restored at the end of 60 days.

The pool system in vogue at the beginning of the strike will be greatly modified or entirely dispensed with.

A minimum wage has been fixed.

No political or religious meetings will be allowed in the mill.

No collections will be taken up by foremen. Any man giving money to a foreman, employing agent, or his superior officer will be discharged immediately, as will the man receiving the money.

The insurance plan has been adjusted so that each man will receive a book showing the amount of money he has paid in and how he is rated.

There will be no Sunday work and a half holiday on Saturday will be put into effect.

Chief of police Thomas A. Farrell has been indefinitely suspended.

Better conditions are promised and a new system will be adopted in the employing of men.

The black list, including the first 600 men who went out, has been wiped out.

The plant will undoubtedly resume operations Thursday morning.

PERSONAL.

Chas. E. Krebs has been appointed general sales agent for the Riverdale Iron & Steel Co., with offices at 828 Monadnock building, Chicago.

James S. Church, former assistant superintendent of the Edward P. Allis Co., has returned from a thirteen months' trip abroad.

William C. Holzworth has resigned the position of superintendent of the Hannah stack of the Republic Iron & Steel Co., Youngstown.

C. S. Barnes, formerly of the Marengo Foundry & Machine Co., Marengo, Ill., has sold his interest in the business on account of poor health.

Fred Miller has resigned from the Miller Mfg. Co., at Monroe, Wis., in order to devote his entire time to the development of a new metal punch and shearing machine which he has invented.

Nathan Fleisher, treasurer of Blake & Knowles Steam Pump Works, East Cambridge, Mass., left New York for Europe Sept. 1, and will remain about six weeks combining business and pleasure.

D. E. Simmons, foreman of the polishing department of the Fairbanks-Morse Co., at Beloit, Wis., has resigned to become superintendent of the Mitchell Motor Car works at Racine, Wis.

F. E. Symons has been appointed western sales manager of the Ralston Steel Car Co., succeeding J. L. Connors, who has been transferred to the Columbus office. Mr. Symons has been assistant at the Chicago office for several months.

After 21 years service with the company, James I. Dissette recently resigned as vice-president of the Indianapolis Foundry Co. His holdings in the company were taken by Frank W. Lewis and Fred B. Whitlock, president and secretary, respectively.

E. M. Heylman, who for the past nine years has been superintendent of the experimental department of the Janesville Machine Co., Janesville, Wis., has resigned to accept a similar position with the Rock Island Plow Co.

B. L. Verner, who has been assistant purchasing agent for the Republic Iron & Steel Co., with offices in the First National bank building, Chicago, has resigned, and has been appointed sales manager for the Blue Island Car & Equipment Co., with offices at 607 Fisher building, Chicago.

Robert Bentley, president of the Ohio Iron & Steel Co., Youngstown, O., who with his family has been touring Europe several months, has returned. While Mr. Bentley was abroad, he had the misfortune to lose his mother, Mrs. Mary Bentley, of Youngstown, who was stricken by illness after her son's departure.

John W. Pickering, from the London office of Sota & Aznar, recently arrived in this country to take charge of the American office during the absence of V. de Ysasi, who is spending some time abroad. Aside from a few scattered cargoes, this interest has made no further sales of Spanish ore than those noted some weeks ago.

DEATH OF WM. H. SINGER.

William H. Singer, for years one of the noted steel manufacturers of Pittsburg but more recently retired from active business life, died Sept. 4 at Providence, R. I., from injuries received in an automobile accident Aug. 25. It was thought at first that his injuries were not serious, but he failed rapidly and was unconscious for three days before his death. Mr. Singer was born in Pittsburg Oct. 2, 1835, and there was educated. After first serving as a clerk in a commission house, he became a clerk in the employ of G. & J. H. Schoenberger, South Side iron manufacturers, with whom he remained until 1860. In that year, he formed the partnership of Singer & Nimick for the manufacture of tool steel, the plant on the original location now being a part of the works of the Crucible Steel Co. of America. When the partnership was turned into a company, Mr. Singer became chairman of Singer, Nimick & Co., Ltd. It was while he was president of Singer, Nimick & Co., to which the name had been changed, that the company's interests were sold in 1900 to the Crucible Steel Co. Mr. Singer became a director of the crucible company from its inception and remained a director until his death. He became interested financially in the Carnegie Steel Co. in 1883, became a director and remained a director until his death. Mr. Singer was a practical rolling mill man and invented a number of practical devices used in manufacturing agricultural steel stock. His development of the saw steel entering into the manufacture of circular saws won a high place for the name of Singer, Nimick & Co. He was a member of the American Institute of Mining Engineers and of a number of clubs. He is survived by a widow and four children.

Isaac Hulme, president and manager of the Vulcan Iron Works, Seattle, died at the Minor hospital, Seattle, Sept. 1. He was born in England 59 years ago and when a young man emigrated to America. He had charge of the mechanical department of the Southern Pacific railway for two years with offices at Sacramento, Cal. In 1893 he moved to Seattle and established the Vulcan Iron Works, which has since grown to be one of the largest concerns of its kind on the Pacific coast.

MAXIMUM TARIFF

Under Payne Law Not Feared by Great Britain.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Aug. 28.

The courteous spirit shown in American official circles towards Great Britain in giving the full amount of notice for the abrogation of trade agreements under the new tariff, is appreciated by British traders, and will tend to strengthen the cordial feeling existing between the two countries. At the same time, it cannot be said that great anxiety on the matter exists in the old country, for the reason that in the practical absence of British tariffs, manufacturers here count, as a matter of course, upon receiving the best treatment possible by America under the most favored nation arrangements. There is no agreement in regard to iron and steel, and as Great Britain does not come under the category of those imposing discriminating duties against America, there is no possibility of her being penalized, in having to pay the new maximum of 25 per cent above the new tariff rates. There is a revision of agreement on account of a change in the tariff upon works of art of British production, and this is the only agreement in existence of the kind between the two countries.

At the same time, Great Britain is rather strongly interested from the competitor's and spectator's point of view, in developments as between America and France and Germany. If any friction arises between either of these countries, England stands to benefit therefrom. The imposition of the maximum tariff on the continent would decidedly benefit Great Britain, giving a kind of preferential advantage.

Considerable importance is attached to the new provisions which deal for example with the declaration of the market value. It is believed that British makers have suffered in the past a good deal from the less scrupulous undervaluation on the continent. The closer supervision over importers will, it is believed, in the long run, operate to the advantage of British traders, who are comparatively free from charges of undervaluation or evasion.

With regard to the numerous reductions in iron and steel schedules, it is too early yet to offer an opinion or apply any test, though it is believed the reduction must, to some slight extent, improve the prospect of British exports. It is anticipated that the inevitable result of the improvement will be to bring a number of orders for British pig iron. This is, however, not to the advantage of the British maker of finished material, since it tends to raise the price of the material for the home manufacturer.

TUNGSTEN ORES IN CANADA.

A report on the tungsten ores of Canada, by Prof. T. L. Walker of Toronto University, has just been issued by the mines branch of the department of mines of Canada at Ottawa. The report covers 56 pages and includes 15 illustrations.

Amongst the rare metals which have recently become of commercial value, tungsten is an important example. One of its most recent applications is as a filament in incandescent lamps, in which it gives a much more brilliant light with greater efficiency than carbon. Its most important use, however, is in the manufacture of tungsten steel, to which it imparts great elasticity and tensile strength. The metal has, therefore, become particularly valuable to the manufacturers of special steels. The known occurrences of tungsten ores throughout the world are comparatively few, which fact lends additional interest to some discoveries of scheelite (an ore of tungsten) which have been made within the past year or two in Nova Scotia. These, together with other occurrences of tungsten ores in Canada, have been made the subject of the present report, which is designed to present to those interested all the available information on these ores.

The several occurrences of tungsten ore in Canada are described in detail, and a general statement is given on the geological occurrence of the ores, chemical tests, concentration, the uses of the metal, producing mines in other countries, statistics of the world's production, etc., while a very useful bibliography of the literature on Canadian and United States occurrences is added.

The first of a series of articles on "Foundry Troubles" begins in the September issue of the Obermayer Bulletin published by the S. Obermayer Co., Cincinnati. This series of articles is from the pen of R. H. McDowell, one of the most practical foundrymen in this country, and he addresses himself to foundrymen who are having trouble with dead, dirty, hard iron, large breakage and heavy losses in general, cupola melting slow and hanging when bottom is dropped, often the last charge or so not melting at all, etc., etc.

WILL STUDY TECHNICAL SCHOOLS IN EUROPE.

Toronto, Can., Sept. 6.—Dr. John Seath, Ontario superintendent of education, will sail for Europe in a few days under instructions from the provincial minister of education to study the system of technical schools in Germany, France and elsewhere, and report to the government. It is intended to make special inquiry into the application of technical instruction to elementary as well as secondary schools, and also into the utility of special courses of study adapted to local industries.

The directors of the Dominion Iron & Steel Co. on Sept. 1 declared a dividend of 7 per cent on preferred stock. After this is paid, there will still be due 28 per cent in back dividends. The present dividend is being paid out of earnings, as owing to the coal strike, no settlement has been made by the Dominion Coal Co. of the amount still due the Steel company. The Steel company is making up the deficiency in deliveries of coal by the Dominion Coal Co. since the strike was declared, by purchasing from other Nova Scotia collieries and from the United States. Coal can now be brought in much more cheaply than was the case during the dispute with the coal company. The cost of American coal laid down at Sydney is stated to be under $2.75 per ton.

The Dominion Bessemer Mines Co. is commencing operations on a large scale on its iron ore properties on Thunder Bay, 22 miles from Port Arthur, about 6,000 acres in extent. The company is constructing docks from which shipments will be made direct by water next season.

The branch establishment of the McClary Mfg. Co., of London, Ont., at Winnipeg, was destroyed by fire Aug. 29. The warehouse, a six-story brick building, was valued at $60,000 and insured for $33,000. Stock on hand to the value of $135,000, insured for $83,000, is almost a total loss.

Charles M. Robertson, formerly superintendent of the Colburn Machine Tool Co., Franklin, Pa., has become associated with the E. L. Essley Machine Tool Co., Chicago and Milwaukee, and will have charge of the sale of the Colburn company's vertical boring and turning mills.

Plans of the Norton Iron Works, Ashland, Ky., contemplate relighting its blast furnace about Oct. 1. Extensive repairs are being completed on the stack.

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

BUFFALO.....932 Ellicott Sq.
CHICAGO.....1328 Monadnock Blk.
CINCINNATI.....First National Bank Bldg.
NEW YORK.....1005 West Street Bldg.
PITTSBURG.....510 Park Bldg.
SEATTLE.....302 Pioneer Bldg.

Subscription, United States and Mexico, $3.00 per annum. To Canada and Foreign Countries, $4.50. The price of copies issued three months or more previous to date of current issue will be 25 cents each. Advertising rates furnished on application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co. will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP.

COPYRIGHT 1909 BY PENTON PUBLISHING CO.

THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

January	5,506
February	5,346
March	5,396
April	5,508
May	5,533
June	5,551
July	5,572

September 9, 1909.

THE RAPIDITY OF RECOVERY IN THE IRON TRADE.

The rapidity with which prices of iron and steel have been recovering since the low point following the February break in finished steel is illustrated by the fact that of late the chief concern felt has been whether the rate of recovery may not be too rapid. The fears expressed before that break, that such an event might be followed by a long period of profitless and damaging competition have been shown to have been entirely unfounded. What is particularly curious, however, is that it is for pig iron that the most is feared. This commodity was not directly affected by the February break. There had been no concerted effort at all to control pig iron, unless the desultory efforts early in the period of steel price maintenance be dignified by being given a place in the archives of the trade. Accordingly, one would not assume that pig iron would be in line, after the disruption of last spring, for any unusual movement. It may be noted, too, that the advance in pig iron has been only about $2 a ton, averaging all grades and districts, and in no important instance has there been an advance of $3. Several steel products have advanced $4 a ton or more and some have advanced about $6.

There is reason to assume, from this antithesis, that the idea that there should be, and that there likely is still to be, a spirit of co-operation among steel manufacturers, remains. There never has been such an idea as regards blast furnacemen, since occasional efforts in that direction have been abortive. The retrospect always affords better means of recognizing the character and bearing of such a movement as the steel price maintenance movement than is afforded at the time. It is clear that that movement added greatly to the appreciation of the value of co-operation of sellers of finished products. What was represented was really the working out of forces always more or less present, but in a new setting, by reason of the new circumstances in the steel trade.

We do not wish these words to be construed as an effort to argue that there is a difference in the primary forces in steel making and in pig iron making, as that is farthest from our purpose. The forces lie in human nature, which is pretty much the same everywhere. The difference is in the alignment of the respective trades, whereby the tendency to co-operate has better opportunity to work out in steel making than in pig iron making.

If it prove true that the rate of price advance in pig iron has been too rapid, there would be no real occasion for alarm. The pig iron market is used to vicissitudes. On account of the many districts, operating under such different conditions and supplying markets so widely separated geographically and as to the character of their demand, there is no general concert of movement. It often happens that pig iron in one producing district is weakening when in another district it is strengthening. There are forces, too, which tend to regulate. In the east there is the imminence of imports, as it is well recognized that no great additional advance can be made in the east without inviting them. In other districts there are actual stocks, or contracts held by merchant interests, the so-called "speculative iron," whereby iron will be released and cut off what might otherwise be a peak in the price curve.

Again, there is no question that the iron trade has entered upon a period of greatly increased tonnage, certainly as compared with the tonnage since the October, 1907, panic, and very probably as compared even with the tonnages made before that time. With such tonnages there is not the least reason to infer that prices would tend to drop to levels reached once or twice last year, or last spring, and this means that there is really not much room for a drop. If there is to be criticism of the recent advance in pig iron, it must be confined to the rate, and not the aggregate, of the advance. The rate of advance can easily decline without the remainder of the market being disturbed at all.

OUR PROGRESS IN TIN PLATE MANUFACTURE.

The American tin plate industry, once the football of the politicians, promises to furnish some extremely interesting developments in the next 12 months on account of the great increase in productive capacity. The industry has shown such vitality that there is good reason to expect it to prosper under strongly competitive conditions, which will make for the lowest possible cost of production. It has been impossible hitherto to export tin plate in large quantities, but the difficulties in the way of international competition are being gradually removed.

As to the prospects of large productive capacity, it may be stated briefly that in the past two years there have been about 325 mills

equipped for the manufacture of tin plate, while the average number of mills in operation through the year has been only between 225 and 250, so that with an equal distribution of work each mill would run only between eight and nine months in the year. The condition has not produced sharp competition partly by reason of the spirit of price maintenance which has pervaded the trade, but chiefly because the demand, being concentrated in the canning seasons, has given full employment to the mills at such times and has saved all of them from long periods of idleness. It may be noted, however, that outputs per mill are being rapidly increased, while many new mills are being built. Cutting out certain plants of the leading interest which it has not operated for a long time and which it apparently does not expect to operate in the future, this interest has 213 serviceable mills. Disregarding independent mills making black plate specialties, there remain enough independents to bring the total number of serviceable mills to about 300, while about 50 new mills are being built, pointing to a productive capacity in tin plate, within about a twelvemonth, of about 350 mills. As to outputs, the mills as a whole have been averaging about 2,200 gross tons per mill per year of full operation. This, however, is far below what some have attained, as better than 10,000 pounds per turn has been done by many mills, and some mills have occasionally reached approximately double this output. It is not unreasonable to expect that the time is not far distant when the mills will be able to average 10,000 pounds per turn, more than double what was done in the early days of American tin plate manufacture. At 10,000 pounds per turn, a year of 50 full weeks will show 3,500 gross tons per mill, and this means 1,225,000 gross tons for 350 mills. The best year's output thus far has been 577,562 tons, in 1906.

The American tin plate industry is no more than 18 years old. The McKinley duty became effective July 1, 1891, and, in the second half of 1891, 999 gross tons of tin plate were made. Of course the industry is chiefly the creation of the McKinley tariff, but the McKinley duty was 2.2 cents per pound, while the Payne-Aldrich duty is 1.2 cents, and the pre-McKinley duty, under which it was admitted tin plate could not be made, was 1 cent per pound. The industry has so established itself that it could exist under the pre-McKinley duty.

The achievement is the more remarkable when it is considered that Germany, although the home of tin plate manufacture, imports at the present time almost as much as she manufactures. The German figures, in metric tons, are as follows for the past three years:

	Production.	Imports.
1906	45,076	37,647
1907	44,518	43,085
1908	48,334	33,378

There have been times when Germany supplied the whole of Europe with tin plate. In the fifteenth and sixteenth centuries Bavaria was the center of the industry, while in the seventeenth and eighteenth centuries Saxony was in the lead. It was from Saxony, in the early part of the eighteenth century, that the British took the art and subsequently built up an industry which for a long time has had the lead. In the past few years, the British production has been between 600,000 and 700,000 tons annually, our own production averaging between 500,000 and 600,000 tons, while Germany, although the cradle of the tin plate industry, has been making only between 40,000 and 50,000 tons. France, Italy and Spain are minor producers, while Austria and Russia occupy relatively insignificant places. Belgium and Sweden, once modest producers, have given up the industry. The world's tin plate production, outside of the United Kingdom, the United States and Germany, is well under 100,000 tons annually, so that the world's production has been running somewhere in the neighborhood of 1,300,000 tons annually. The United States alone will soon be able to approximate this output.

The high labor cost of tin plate making in the United States has hitherto prevented any large engagement in the export trade. In certain directions this labor cost has been reduced, as in some departments the labor cost per day has not materially increased as the output per mill has increased. The most expensive item has been the hot mill work, where tonnage rates have always prevailed except occasionally during labor disputes. Many efforts have been made to reduce this cost. The early efforts were quite novel and at this time are amusing. One effort was to roll fluid metal direct into a thin sheet, between enormous rolls. Another aimed to lead the material back and forth between rolls in a way that would have required steel to be about as obliging as is paper in a modern perfecting press. Experiments have shown conclusively, however, that development must lie along the line of methods rather than apparatus. The changes which have been made, and which are likely to be made in future, are in manipulating the material more rapidly through the rolls, rather than in supplanting the principle of passing the material, time by time, through the two-high mill. But for the dominance of a labor union, improvements lately made would probably have been made in the early days of American tin plate manufacture. In future the improvements will probably be made with still more facility than of late, and through the stress of competition American tin plate will probably find means of entering largely into the markets of the world.

One gateway, closed last year, has recently been opened, that into the Canadian market. In the spring of last year, the Canadian anti-dumping duty was ordered upon American tin plate, whereby the Welsh manufacturers were given an advantage more than offsetting the lower freight rates enjoyed by American mills. On account of the discontinuance of tin plate manufacture in Canada, temporarily at least, the anti-dumping duty has lately been removed, and the American tin plate export trade to Canada, interrupted a little over a year ago, is being resumed.

AMONG MACHINERY MAKERS.

NEW YORK.

Orders for Machinery During August Were Well Distributed.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Sept. 7.

The general suspension of business over Labor day, coming at the end of the holiday season, has held down the volume of business during the first week of this month and has rendered conditions considerably less active than was the case during August. Several large machine tool interests, which have now had time to analyze their business for that month, find that while its total was somewhat less than in July, it was much more satisfactory in that it was extremely well distributed, in contrast with the more limited number of very large orders which made July the best month since the beginning of the depression. During the past week a part of the Fiat Automobile Co. requirements were filled, orders being placed for the lathes and milling machines, but at this writing an assortment of other machines is yet to be placed.

Reports have been current that the Lucknow Iron & Steel Co., Harrisburg, Pa., was making important improvements at its Manatawny plant in Berks County, Pa. We are advised, however, that these reports are exaggerated, as all that is being done is the renewal of some pinions and other machinery which has become badly worn.

The Ralston Steel Car Co., with offices at Columbus, O., and 2 Rector street, New York City, which has arranged a bond issue of $500,000, will use the greater part of that amount to increase its working capital. About $60,000, however, will be expended in the early future in balancing up the plant at Columbus, increasing the forging and other departments so as to bring them up to the efficiency of the riveting department, which has a capacity of 50 or 60 cars per day. The company has orders sufficient to keep the plant at full operation for the next three months.

The Empire Graphite Co., which recently lost its plant at Greenfield Center, Saratoga County, N. Y., by fire, is shortly to begin its replacement. A concrete and steel building, 200 x 200 feet, will be erected and considerable equipment will be required. The matter is being handled from 271 Broadway.

Within a short time plans will be completed for the improvements which the Eastern Steel Co. has decided upon for its works at Pottsville, Pa. These include the addition of two basic open-hearth furnaces and the improvement of the yard equipment by increasing its cutting and shipping facilities.

The industrial car market is extremely active at present, inquiries and current orders being largely for export. An order for South American shipment placed during the week with the local office of the Youngstown Car Mfg. Co. is unusual in that all the sills and plates are galvanized to withstand the rusting influence of the salt air. The order calls for thirty all steel flat cars, 40,000 pounds capacity, which will be used for asphalt work. The United Fruit Co. is in the market for a number of cars and other plantation equipment, and an inquiry is current for 30 cars, 100 cubic feet capacity, for railroad work in Chile, but the order will likely go abroad because of the character of the specifications. An order for 30 plantation cars has been placed with Gregg & Co. through L. W. & P. Armstrong, 106 Wall street, for the Fajardo Sugar Co. in Porto Rico. It is understood that this interest will erect an additional mill next season.

CLEVELAND.

Manufacturers Hunting for Sites—Continued Increase of Orders.

Office of THE IRON TRADE REVIEW, Browning Building, Sept. 7.

Some local manufacturers are confronted by a peculiar situation, the inability to secure new sites for manufacturing purposes. The return of prosperity has brought with it possibilities, and in many cases the necessity for expansion. Every week adds to the list of manufacturers who are obliged to enlarge their present plants to enable them to keep up with orders. In many cases, expansion had been anticipated by manufacturers who are now merely adding to their plants as they stand. Many others are not so fortunately situated, however, being located in power blocks, which absolutely preclude any opportunities for growth, and it is such who view the situation with alarm.

A local real estate man of some prominence recently made the statement to a representative of THE IRON TRADE REVIEW that real estate dealers cannot begin to supply the demand for factory sites, especially those with railroad facilities, at reasonable prices. The only way in which the situation can be relieved, is for manufacturers to locate in the cut-skirts of the city, which in many ways is undesirable.

Machinery makers in general report that there is no let up in activities and that prices are strengthening in a slight degree. A prominent manufacturer of railway supplies advises that the business of his company during the month of August was about 40 per cent greater than ever before in the history of the concern, which is an indication that the railroads have again become important factors in the market.

The Van Dorn Iron Works Co. advises that its business is looking up and that every department is busy, especially the structural department, which is running overtime. This concern has been obliged to increase its working force 20 per cent during the past few months. With several other contracts on hand, the company is now engaged on a large building for The National Malleable Casting Co., Cleveland, together with a large contract for Corrigan-McKinney & Co., Cleveland.

The H. V. Hartz Co., manufacturer of steel tackle blocks and flue welding machines, reports that its business of August, 1909, compared with the same month of 1908 shows a gain of 33 per cent in block business and about 500 per cent in the machine end. The company has been obliged to add new equipment recently, among which are a large bulldozer, a drop hammer, and a lathe.

The Bruce-Macbeth Engine Co. states that it has been operating both its plants well up to their capacity and has also been very busy making alterations, due to combining the plants of the Macbeth Iron Co., and The Bruce-Meriam Abbott Co. The gas engine business is particularly good and the company will be running on full capacity in this line for some time in the future, on orders now on hand.

The International Heating & Lighting Co. reports that it is now completing at Brandon, Manitoba, a gas works and complete system of mains. The total expenditure involved is in the neighborhood of $150,000.

The Gas Machinery Co. advises that it has a great many inquiries at the present time and has received a con-

siderable number of contracts for new apparatus during the last 60 days, generally at low prices. The prospects for fall business are of the best.

CINCINNATI.

Increased Labor Cost Threatens Rise in Prices.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Sept. 7.

Orders for machine tools continue large enough to give some of the shops more business than they can take care of between now and the first of the year and the number of shops behind on deliveries is steadily increasing. The stocks of machines accumulatd during the depression have been reduced and some of the manufacturers have no machines on the floors in stock while others have only a few sizes left out of rather liberal accumulations. The demand is gradually enlarging and is including the heavier types of machines which have been slow to share in the general awakening of machine tool demand. There is an insistent call for labor in the shops and working forces are being increased as fast as suitable men can be secured. Wage rates are increasing and the manufacturers are compelled to pay from 5c to 8c per hour more for some classes of labor in the shops than they have paid for such service in the past. The increase in cost of production is giving rise to discussion of the question of an advance of prices of machine tools, and the opinion prevails generally among the shops that an advance in prices is inevitable, due largely to the increasing cost of labor.

There is a well sustained demand and inquiries are numerous, the automobile industry is still conspicuous in the purchases.

The C. R. I. & T. Ry. has out a list of machine tools, but except in a general way the railroad purchases and inquiries have not yet reached the shop department. An awakening of railroad demand now would test the capacity of manufacturers to the limit, as sales for 1910 delivery are already being made. It would appear that the shops in this center with the exception of the makers of very large tools have returned to normal business.

The Willard Machine Tool Co. expects to be able to occupy its new building in Covington, Ky., by Oct. 1, and is preparing to put on the market a line of lathes with some special features for rapid production of certain kinds of work. While the new tool is designed to be useful in machine shops generally, the company expects it to appeal to the automobile manufacturers particularly.

The Lodge & Shipley Machine Tool Co. is enjoying a heavy run of orders and during August secured an order from the Buick Motor Car Co. for 126 lathes.

The Cincinnati Shaper Co., reports business in its line excellent and had a heavy run of orders in August. The company is out of stock on some sizes, and all stock is rapidly being taken out.

The Oesterlein Machine Tool Co. reports business in excellent shape and has sold out all stock and is now behind on orders.

The John Steptoe Shaper Co. has received a number of good orders during the past week and regards the outlook as excellent for continuance of demand.

Herbert Bieler, formerly with the Cincinnati-Bickford Co., is now connected with the R. K. LeBlond Machine Tool Co.

MILWAUKEE.

Plants Busy Throughout the State—New Manitowoc Concern.

Milwaukee, Wis., Sept. 7.—Indications are that it is not only the machinery and iron working concerns of Milwaukee which are meeting with steadily increasing business, but that the various plants about the state are also experiencing nothing short of a revival in trade. In fact, it was the smaller concerns of the state where the first real improvement began after the long panic period.

A typical instance of the improved conditions about the state is the situation at the Beaver Dam Malleable Iron Works, Beaver Dam, Wis. Officials of the plant in speaking of trade conditions say:

"Our malleable iron plant has been rushed with work for some months now and orders are coming in at a most satisfactory rate. We have had considerable trouble securing men and we have finally secured a carload of employes from the east. The prospects are of the very best."

Conditions prevailing at the Kaukauna Machine Works, Kaukauna, Wis., are of the best. Every department of the machine shop and foundry and the carpenter shop in connection is rushed with orders and A. W. McLain, manager, announces that his available supply of labor is not large enough. The plant makes a specialty of paper making machinery and orders for equipment in this line were received this week from Oklahoma and British Columbia.

The Business Men's Association of Green Bay, Wis., is endeavoring to secure the plant of the Eagle Aluminum Mfg. Co. of Eagle River, Wis. The company desires to enlarge and increase its business and is seriously considering Green Bay as the location of a new factory. About 100 people would be employed.

The establishment of one of the largest foundry and machine plants in Wisconsin is being planned for by the Manitowoc Foundry Machine Co., Manitowoc, Wis. Col. W. M. Glenn, of Waukesha, Wis., has become interested in the company with George Smith, and a deal has just been closed for the purchase of the property of the A. Rank estate at Fifteenth and Franklin streets, formerly occupied by the Manitowoc Pickling Co. The Foundry-Machine company owns the property adjoining and with the purchase will have an entire block. Plans will be approved at once and work will be started within a month on the erection of an addition to the foundry and machine shops. Modern machinery will be installed and the plant will be placed in the best possible shape. The enlargement of the plant will necessitate a large increase in the force of employes. The Manitowoc Foundry-Machine Co. makes a specialty of manufacturing the largest castings used by the railroads.

BUFFALO

Boiler Works Are Busy—New Construction Projects.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, Sept. 7.

The Lake Erie Engineering Works and the Lake Erie Boiler Works, Buffalo, which are allied interests, report that so far as their plants are concerned business is in a splendid condition, and probably no interest in Western New York suffered less from the depressing periods past than these, as all the works have a full force of men employed and recently the companies have been working two shifts, both on new output and repair business. Numbered among recent orders is one from the Great Lakes Engineering Works, Detroit, Mich., for six Scotch boilers, 14 feet diameter, 12 feet long, 180 pounds capacity, and for the same interest three Scotch boilers, 12 feet in diameter and 11 feet long, 200 pounds capacity. An order has been received from the Fore River Ship Building Co., of Boston, Mass., for two Scotch boilers 10 feet in diameter and 10 feet long, 150 pounds capacity. The Erie Railroad Co. has ordered one

Scotch boiler, 6 x 8. W. H. Follette & Co., Tonawanda, N. Y., have ordered one doghouse boiler, 8 x 8. Another order just booked comes from the Empire Ship Building Co., Buffalo, for one marine tip boiler, and another for a boiler 5 x 9 ordered by the owners at Cleveland of the steam tug "Charm." The same interests are installing a number of rail mill devices at the Lackawanna Steel Co.'s plant at Buffalo, which will materially augment the steel company's facilities for manufacturing rails.

A company is being formed by Buffalo and Erie manufacturers, and it is expected that a plant will be built in one of these cities for the purpose of manufacturing hardened copper. A feature of the enterprise will be the use of the Dawson process. It is claimed that by the use of this system hardened copper may be made at a single operation. The enterprise is to be known as the Dawson Hardened Copper Co., of Erie, Pa. The president is L. J. Chase and G. T. Fox is the treasurer. J. E. Young and Frank A. Abbott are also directors.

The Buffalo Union Furnace Co. will begin work at once installing pig iron casting machinery at its South Buffalo plant.

Following are new construction projects in this district:

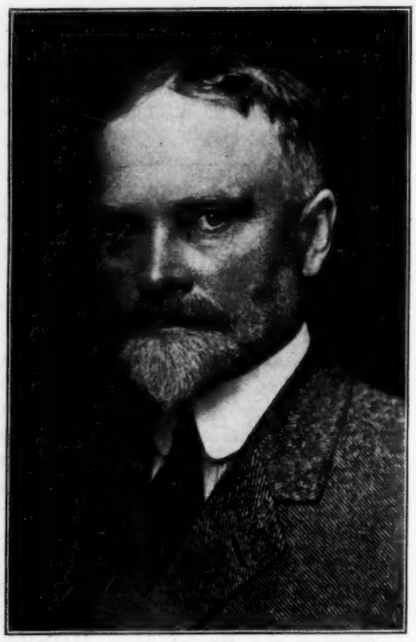
Engine house at Norwood, N. Y., by the New York Central railroad; power houses and factory buildings for the John G. Ebbs Paper Co., Rochester, and the Shelden Motor Vehicle Co., 72 North street, Rochester; factory for the American Chemical Mfg. & Mining Co., Rochester, contract let and work started; boiler house, engine house, coal shed and grinding house for the Cayuga Lake Cement Co., Ithaca; power house for the New York, Auburn & Lansing railroad, Ithaca, to be equipped with a 5,000 horsepower hydro-electric plant; machine shop, foundry, cupolas and core room for the Mohawk Foundry Co., Scotia, N. Y.; power house, foundry and warehouse for the American Laundry Machine Co., Rochester, contract let to the Gorsline & Swan Construction Co., Rochester.

Robt. E. Turnbull, representing the Henry E. Pridmore molding machine works, Chicago, has gone to the Alaska-Yukon-Pacific Exposition, at Seattle, to take charge of the three Pridmore molding machines which have been installed in the model foundry at the Exposition.

COMPENSATION FOR INJURED WORKMEN.

In an address to the members of the Lake Superior Mining Institute at Ishpeming recently, President M. M. Duncan took advanced ground on the subject of compensation to workingmen who are injured in the service of their employers, and, though the paper was addressed to mining men, its principles apply to all lines of industry.

At the outset Mr. Duncan laid down the propostion that about 75 per cent of the injuries to workingmen are such that the employer es-



M. M. Duncan.

capes liability either through the doctrine of contributory negligence or fellow servant law so that in all such cases the burden falls upon the injured or upon his family if he dies.

The speaker pointed out that the growth of industry had vastly increased the risk of injury in the last 25 years on account of sky scraper construction in cities, deeper mines, greater traffic on railroads, the application of electricity in many lines of industry and in other ways.

"Public sentiment," he said, "demands, and good policy requires the adoption of laws which will give employes adequate compensation in case of accidental injuries as well as for those which are called accidental injuries. Our present system is unjust from an economic standpoint and has been discarded in every industrial country in the world except our own and Canada."

Mr. Duncan pointed out that the government cannot act on account of the constitution except in a limited field and said that such laws as the states had passed were inadequate, or else tended to help scheming lawyers rather than the injured men.

In searching for a remedy Mr. Duncan believed an investigation should be made into the systems in vogue in other countries. Minnesota he said has already appointed a commission for that purpose. In England, the home of the common law, he said the old common law doctrines, still in force here, have been abolished and replaced by the compensation act under which every business must make measured compensation to every employe injured in the course of his employment unless there is gross fault on the part of the employe. The employe is not required to prove negligence, and in case of death, compensation is based on the earnings of the deceased. Choice is given to the injured whether to proceed under the old law or the compensation act and the workmen prefer the compensation act.

Since deaths from accidents are inevitable Mr. Duncan declared that he regarded compensation not as damages collected but as method of fairly distributing the risks of civilization.

"Such payments," he said, "become a part of the cost of production like the replacement of worn out machinery and if compelled by law would not be detrimental to the employer."

COKE PRODUCTION FOR 1908.

A report by E. W. Parker of the United States geological survey which is now in progress shows that West Virginia was the second state in the union in the production of coke in 1908, having exceeded Alabama, the third state, by 274,457 tons, but Alabama was second in the value of its coke product having surpassed West Virginia $1,902,847. This difference in value is accounted for by the proximity of the Alabama coke region to the iron centers of that state while most of the West Virginia product has to be shipped to points out of the state. The average value per ton of West Virginia coke was $2. The state produced 2,637,123 short tons of coke during the year valued at $5,267,054, against 4,112,896 tons the year before worth $9,717,130. The decrease in value was 45.8 per cent and in quantity, 35.88 per cent.

U. S. Steel Leads Market Upward

The stock market last week was dull during the early part but picked up briskly toward the close with a decided advance in prices. United States Steel common made a new record of 80¼. Grain was weak throughout the week with corn firm on adverse crop reports.

The market was reassured Monday by a personal letter from E. H. Harriman as to his improving health and advanced. Tuesday the market was duller with money easy and prices inclined to sag. Wednesday the market was dull and lower; grain was weak but corn was higher upon unofficial estimates of the amount of the crop. Thursday the market was dull but firm and the rise of Steel common was followed by an upturn in the general market. A government report showing the condition of the cotton crop to be the lowest ever reported in September had been anticipated and discounted. Friday Steel was the feature and sales of that stock constituted about one-third of all the business. It closed at the highest price ever reached for the issue. Saturday was a holiday.

Call money continued through the week at from 2 to 2½. Time money was dull. There were no gold exports from New York during the week. Imports of gold amounted to $140,635.

Clearings throughout the United States for August established a new summer record, having reached $13,490,000,000, an increase of 30 per cent over August, 1908. The actual report of clearing house banks showed: Surplus decreased $7,704,950; loans decreased $1,870,900; deposits decreased $11,913,400. The ratio of reserve was 27.5 per cent against 26.3 the week before. Trust companies and non-member banks showed loans and investments decreased $2,234,200, deposits decreased $9,633,500, and the percentage of reserve 18 against 18.1 the week before.

Commercial failures for the week were 201 against 172 the week before, and 244 the corresponding week last year. Liabilities in commercial failures reported in August were $9,620,576 against $23,782,378 in August, last year.

The number of shares traded in during the week was 3,133,650, against 5,649,450 the week before and 3,537,964 for the corresponding week the year before. Sales of bonds other than government bonds amounted to $14,333 000 against $22,967,000 the week before and $25,505,000 the corresponding week of last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo- Sept. 4	Changes in week	Date 1909 Ann. M't'g.	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	15¼	+ ¼	Sept. 2	$19,820,000		.....	.....
Allis-Chalmers, pr.	53	+ ½		16.150,000	7 cum	1¾ Q.	Feb., 1904
American Can	12¾	+ ⅜	Feb. 2	41,233,300		.....	.....
American Can, pr.	83¾	+1¼		41.233.300	7 cum	1¼ Q.	July, 1909
Am. Car & Foundry	67⅞	+1¾	June 24	30,000,000		½ Q.	July, 1909
Am. Car & Fdy., pr.	120	+1		30,000,000	7 n. c.	1¾ Q.	July, 1909
American Loc.	59⅜	+ ⅝	Oct. 19	25,000,000	5	1¼ Q.	Aug., 1908
American Loc, pr.	115	—1¼		25,000,000	7 cum	1¾ Q.	July, 1909
American Ship	65	.....	Oct. 13	7.600,000	4	1 Q.	Sept., 1909
American Ship, pr.	110	+2		7,900.000	7 cum	1¾ Q.	Oct., 1908
Am. Steel Foundries(new)	59	+2	Dec. 2	17,184,000		.....	.....
Barney & Smith	30	—5	June 1	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith, pr.	100	.....		2,500,000	8 cum	2 Q.	June, 1908
Bethlehem Steel	35¼	+3⅛	April 6	14,862,000		.....	.....
Bethlehem Steel, pr.	69	+5½		14,908 000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	44⅜	+1⅛	March 16	45,000,000*	3	1½ S. A.	Aug., 1909
Cambria Iron	44¼	—2½		8.468,000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	31	— ¾	Feb. 15	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	45⅜	+1⅞	Oct. 18	34,235,500		3½	April, 1902
Crucible Steel	13¾	+ ¼	Oct. 20	24,578,400		.....	.....
Crucible Steel, pr.	81½	+1½		24,436,000	7 cum	1 Q.	Mar., 1909
Empire Steel	10	.....	April 27	1,254,770		.....	.....
Empire Steel, pr.	65	.....		2,500,000	6 cum	3 S. A.	July, 1909
Fay & Egan	90	.....	Feb. 18	1,000,000	7	1¾ Q.	Nov., 1908
Fay & Egan, pr.	110	.....		1,000,000	7 cum	1½ Q.	Aug., 1909
General Electric	166½	+ ½	May 11	65,178,800	8	2 Q.	July, 1909
Harbison-Walker	31	.....	Jan. 18	18,000,000		½	Oct., 1907
Harbison-Walker, pr.	95	.....		9,600,000	6 cum	1½ Q.	April, 1909
International Pump	48¼	+4¾	June 8	17,762,500		1	April, 1905
International Pump, pr.	89⅜	+ ⅞		11,350.000	6 cum	1½ Q.	Aug., 1909
Lackawanna Steel	54	+3¼	March 10	34.971,400		.....	.....
Lake Sup. Corp.	27½	— ¼	Oct. 6	40.000,600		.....	.....
New York Air Brake	86	—3¾	June 17	8,012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	100	.....	Feb. 3	8,500,000	3	1½ Q.	Sept., 1909
Niles-Bement-Pond, pr.	100	.....		2,000,000	6 cum	1½ Q.	Aug., 1909
Otis Elevator Co.	60	.....	March 15	6,375,300		1½ S. A.	Oct., 1909
Otis Elevator Co., pr.	99	—2		6,295,000	3 n. c.	1½ Q.	July, 1909
Pa. Steel	68	.....	May 10	10,750,000		.....	.....
Pa. Steel pr.	117	+1		16,500,000	7 n. c.	3½ S. A.	May, 1909
Pittsburg Coal Co.	22⅜	+ ⅞	March 9	28,104,600		.....	.....
Pittsburg Coal Co., pr.	62¼	+2¼		27,071,800	7 n. c.	1¾	April, 1905
Pressed Steel Car	50¾	+1¾	Feb. 17	12,500,000		3	Aug., 1904
Pressed Steel Car, pr.	106	+3		12,500,000	7 n. c.	1¾ Q.	Aug., 1909
Pullman	195	+4½	Nov. 10	100,000,000	8	2 Q.	Aug., 1909
Railway Stl. Spring	50¾	+2¾	March 4	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring pr.	108	+ ⅞		13,500,000	7 cum	1¾ Q.	July, 1909
Rep. Iron & Steel	38⅞	+2	Oct. 20	27,191,000		.....	.....
Rep. Iron & Steel, pr.	106¾	+2¾		20,416,900	7 cum	2 Q.†	Aug., 1909
Sloss-Sheffield	86½	+3⅜	March 10	10,000,000	5	1¼ Q.	Sept., 1909
Sloss-Sheffield, pr.	119¾	+ ¾		6,700,000	7 n. c.	1¾ Q.	July, 1909
U. S. Pipe & Fdy.	33⅜	+1⅞	June 23	12,500,000	2	½ Q.	Dec., 1907
U. S. Pipe & Fdy. pr.	85	.....		12,500,000	7 n. c.	1¾ Q.	Sept., 1908
U. S. Steel	80⅛	+4¾	April 19	508.302,500	3 n. c.	¾ Q.	Sept., 1909
U. S. Steel, pr.	127¼	+3¼		360.281,100	7 cum	1¾ Q.	Aug., 1909
U. S. Steel, 5s	114¾	.....		463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	68	+3	Sept. 21	9,073,680		.....	.....
Westinghouse Elec.	86	+1½	June 16	27,173,200	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	119	+2	Oct. 5	14,000,000*		2½ Q.	Aug., 1909

Par value of shares, $100, except those starred (*), $50.
†¼ ex. and 6¾ to apply on deferred dividends.

Copper Stocks.

New York. — Amalgamated copper closed last week at 84, a gain of ¾.

Boston.—Butte Coalition closed at 25½, increase ½; Calumet & Arizona closed 103, decrease 2; Calumet & Hecla closed 680, no change; North Butte closed 61¼, increase ⅞; Quincy closed 91, increase 2.

Financial Notes.

Calumet & Hecla declared a dividend of $8 per share Sept. 3, that being $2 advance upon the last previous dividend.

Equivalent to a College.— A student of Sibley College, Cornell University, inquiring as to how much credit he would obtain for shop work done during the vacation, was told that it was the practice to give one hour's credit for every two hours devoted to actual work in a shop or foundry, provided the latter were approved by the factu ty as a proper place for gaining useful experience. Asking if the Yale & Towne works at Stamford would fit this description, he was informed that double credit would be given for any time spent in these works, as, in the opinion of the faculty, it was the full equivalent of the instruction given at the college, and that in this respect it ranked with a very few of the leading industries of the United States.

ELECTRIC SMELTING OF IRON ORES.

As a sequence to the reports on "Electric Smelting of Iron Ores," published in 1904, 1906 and 1907, the mines branch of the department of mines of Canada has just issued the results of "An Investigation of an Electric Shaft Furnace" in operation at Domnarfvet, Sweden. The investigation was made by Dr. Eugene Haanel in December, 1908, on the invitation of the inventors, and the results given represent the latest developments of the electric smelting of iron ores.

The report contains 38 pages and is divided into four parts. Part 1 deals with the Domnarfvet furnace, the trial runs witnessed by the writer of the report and the comparative costs of production of pig-iron by the furnace. The other three parts which are more of the nature of appendices, describe: (1) a new electric furnace for the manufacture of steel, (2) the manufacture of electrodes, (3) methods of manufacturing wood-charcoal, this material being used to supply the carbon which enters into the composition of pig iron manufactured by electric smelting.

Three full page plates, from photographs, and numerous drawings, illustrate clearly the descriptive matter of the book, which, taken in conjunction with the reports previously published by the mines branch on the subject of electric smelting, brings up to date the literature on the electro-metallurgy of iron.

The "Report on the Investigation of an Electric Shaft Furnace" at Domnarfvet, Sweden, may be obtained on application to Dr. Eugene Haanel, director of mines, department of mines of Canada, Ottawa.

CAR ORDERS.

Chicago, Sept. 2.—Large orders for cars and locomotives continue to be placed by western railroads. The Rock Island placed a contract for 1,100 box cars, 400 flat cars and 50 cabooses with the American Car & Foundry Co., and the Western Steel Car Co. received an order from this road for 1,000 box cars, while the Standard Steel Car Co. was awarded 500 furniture cars. The Soo line has ordered 50 consolidated type locomotives from the American Locomotive Co. The Frisco system has contracted for 500 coal cars, 500 hopper cars, 250 flat cars and 150 cabooses; these will be built by the American Car & Foundry Co., while from the Standard Steel Car Co. were purchased 500 coal cars and the Baldwin Locomotive Works will build 20 Pacific type locomotives and 15 consolidated type locomotives for this road. All of the cars noted will be built with steel underframes. The Frisco system is also asking bids on 31 passenger cars. Other orders include 1,500 cars placed by the Northern Pacific and 500 by the Great Northern.

LOST TIME—10,000,000 DAYS!

The fact that over 10,000,000 working days were lost last year through strikes and lock-outs, should give pause to all concerned before they resort to these methods of industrial warfare. The fact and the figures are taken from the annual report on strikes and lock-outs in the United Kingdom and on Conciliation and Arbitration Boards just issued. It shows that the amount of industrial disturbance caused by trade disputes was greater in 1908 than in any year since 1898. This is entirely accounted for by the disputes in the engineering and shipbuilding industries on the North-East Coast, and in the cotton spinning industry in Lancashire. These three disputes laid idle 166,000 workpeople, and caused a loss in working time of eight and a quarter million working days. In hope of a better state of things in the future, it is mentioned that the shipbuilding dispute led to a series of conferences, as a result of which machinery was set up early in 1909 for dealing with differences between employers and workpeople in this industry, while in the engineering trade and in the cotton industry similar arrangements are being considered.—*Machinery Market.*

Mrs. Harry Pawling, wife of Harry Pawling, of the Pawling & Harnischfeger Co., crane manufacturer of Milwaukee, was killed and her husband and his brother, Robert Pawling, and a friend, Frank Fraser, were injured last week when a Chicago, Milwaukee & St. Paul train struck the automobile in which the party was riding at a point west of Milwaukee. Mrs. Pawling, a bride of two months, died soon after being taken to the Emergency hospital at Waukesha. Other members of the party are recovering. Harry and Robert Pawling are sons of A. Pawling, president of the Pawling & Harnischfeger Co. Frank Fraser, the other member of the party, is a son of Donald Fraser, vice-president and superintendent of the Chain Belt Co.

The Belfont Iron Works Co., Ironton, O., turned on the blast in its furnace Aug. 23, after it had been banked for two months.

PENNSYLVANIA RAILROAD'S SCRAP CLASSIFICATION.

The Pennsylvania Railroad Co. has issued the following classification of scrap it produces as a guide to buyers:

Axles, Iron—All kinds.
Axles, Steel—Car, tender, engine truck and other axles, car and locomotive under 6 inches diameter.
Axles, Steel—Driving and other axles, 6 inches diameter and over.
Boiler, Steel—Boiler and fire box steel without flues or trimmings, cut in sheets and rings.
Bolsters—Cast and pressed steel.
Borings, Cast Iron.
Brake Shoes, Steel Back.
Car Scrap, Miscellaneous—Material from the bodies of burned wooden cars with exception of air brake material and couplers and attachments.
Cast Iron, Heavy—Includes pieces weighing 200 pounds or more, free from burnt grates and stove plates with the exception of hammer dies, anvils and extra heavy hydraulic machinery.
Cast Iron, Light—Includes pieces weighing 200 pounds or less, free from burnt grates and stove plates.
Couplers and Knuckles, Steel.
Tubes, Tube Ends and Pipe—Includes all kinds of boiler flues, flue ends and wrought iron pipe, regardless of length.
Malleable Iron—Includes malleable couplers and knuckles and all malleable castings, free from wrought and cast iron.
Screw Cuttings.
Sheet—Includes all kinds of iron and steel sheets (except galvanized iron and tin and cut up boiler steel); includes also smokestack netting or any iron or steel wire nettings; also barrel hoops and shovels (free from wood).
Spikes, Iron and Steel, Etc.—To include spikes, track bolts, nuts, lag screws and similar material; also iron splices.
Springs, Steel—Including flat and coil.
Steel, Miscellaneous—No. 1 charging box size, not over 22 inches wide and 6 feet long.
Steel, Miscellaneous—No. 2 over charging box size.
Steel (from destroyed Steel Cars)—Sills and sheets from destroyed steel car bodies.
Stoves and Grates—Including all burnt cast scrap.
Tanks, Steel—3/16-inch to 5/16-inch thick (original thickness).
Tires, Steel—All kinds—grooved and plain.
Turnings, Steel.
Turnings, Wrought.
Wheels, Altoona.
Wheels, Miscellaneous Cast Iron.
Wheels, Rolled Steel.
Wrought Iron—All wrought iron 6 inches and longer, except splices, channels and engine frames.
Wrought and Steel Punchings and Clippings.

WILL MANUFACTURE SPARK ARRESTERS.

The Armstrong Spark Arrester Co., Cincinnati and Boston, has been formed for the manufacture of the Armstrong spark arrester for locomotives. The officers of the company are Albion F. McCarthy, president; Carter C. Armstrong, vice president and William C. Armstrong, secretary and treasurer. W. C. Armstrong states that the spark arrester has been in operation on the Carrollton & Worthville railroad for over a year and that no fire has been occasioned on the right of way from locomotive sparks since the device was installed. It consists of an inner stack with a deflecting plate over the top which deflects sparks and cinders into an outer tube and drops them into a box alongside the steam chest or under the locomotive.

THE IMPORTANCE OF SYSTEM IN MANUFACTURING ENTERPRISES

By Oscar E. Perrigo, M. E.

The more deeply we investigate the usual routine of manufacturing plants, the more reason we shall find to notice the lack of system in the transaction of business. This condition is not confined to the operations of the manufacturing departments, but is quite as likely to begin very close to, if not actually in the general office, and from there to spread all over the plant.

In fact, the specialist who seeks for the reasons for the inefficiency of the plant will more frequently be rewarded in his quest by beginning at the top and working downward, than by beginning at the bottom and attempting to work upward. If he can thoroughly convince the head of the establishment of the importance, the value and the necessity of system and systematic methods of handling the business, from the top downward, he will have gone a long way toward the adoption of the real system that means, not red tape, but increased output and decreased costs.

Let us examine the question somewhat in detail for the purpose of arriving at a better understanding and appreciation of the facts and conditions.

"Order is Heaven's first law." Without it the universe would be chaos, confusion and destruction. Order is the regular and methodical arrangement or established succession of events. This implies a preconceived *plan*. Hence, a system presupposes a logically and scientifically formulated plan, based upon a distinct method and forming a complete scheme or progression of events and functions in subordination of the basic or fundamental idea.

In nature we find every event and every change or transition from one state or condition to another made in conformity to some one of the unchanging natural laws, as a part of the grand *system* by which the universe is ordered and controlled. This is Nature's *plan*.

In many respects man has endeavored to imitate the systems of nature by adopting theories and formulating plans in accordance with the laws of Nature, a correct understanding of which is of the utmost importance to the success of the plans of many of the human achievements of the past and present.

The plan then, must first be conceived and the system formulated in accordance with it. Therefore, if we are to engage in the inauguration of any of the industrial, commercial or scientific enterprises of the present day, the initial and important duty is the proper conception of a comprehensive plan for the work.

When we consider carefully the many and various uses of a system in the business of manufacturing and selling, and in fact, of any branch of business, we shall see of what vast importance it is, first, to have a system of *some* kind; second, to have a system adapted to the particular kind of business to be carried on, and third, to have the best system that can be devised for the purpose. The necessity for a system should appeal to every man who takes the trouble to consider the conditions of business, particularly manufacturing business, of the present day.

The Test of Practical Use.

This is emphatically an age of progress and we cannot stand still if we would. We must, inevitably go ahead or drop behind in the march of progress. The procession will move whether we approve of its course or not. If we do not move with it, we will be left hopelessly in the rear. We may have ideas that differ from those of our competitors and which we think are the proper ones to put into practice. They will be tried by the test of practical use. If good they will be made use of and may become a part of the grand and successful systems of the future. If visionary and impractical they will find their way to the mental "scrap heap" as certainly as the obsolete and worn out machine.

The administration of a modern manufacturing business is no longer a game of chance as was frequently the case in former times when profits were much more remunerative and a man could conduct his business on "a hit or miss" principle with a fair chance of success, since his neighbors pursued the same course and he had the same opportunities and incurred the same risks that they did.

It is quite true that there are concerns today who are doing business in much the old fashioned way and that they meet with a considerable degree of success, not *because* of their methods, but in *spite* of them. These establishments have certain advantages, however, that newer concerns do not. Having been long in the business they naturally have an established trade with a long list of regular customers upon whom they can rely for a certain volume of trade and at their usual rates of prices, which may be considerably higher than those of the regular market, but which they succeed in maintaining because their goods are well and favorably known and there are no chances of disappointment in buying from them.

But even these advantages, great as they are, will not last. The lines of competition are very sharply drawn and the customers of these time-honored and substantial firms will reach a point, in fact many of them have already reached the point, where they cannot afford to buy from concerns because of their long established and high reputations, if this is all that permits them to charge higher prices for their goods.

It has been time and again proven, to the satisfaction of the purchasing public that a new company organized on modern principles, and with the advantages of modern systems and methods; and unhampered by the handicaps of old business ideas and the traditions of ancient shop methods, have been able to invent, develop, manufacture and put into the market new machines that would really excell in workmanship and in the excellence and efficiency of output those of the old established companies.

And in accomplishing these important and desirable results they have, by reason of their modern methods and systems of management of the productive and commercial departments of their business, been enabled to turn out their product with such certain and accurate knowledge of its actual costs that they could fix their selling prices considerably below that of old established manufacturers of like classes of machinery.

The key to this condition is *system*, since system should always stand for *economy*; to buy material economically, to handle and use it economically, to work it up by economical methods, to assemble, erect and test the resulting machines methodically

and therefore economically; to advertise, sell, and ship the product economically, because every step from the design of the machine until its final shipment is upon a well conceived and well formulated *plan* and *system,* the results of which are known, step by step. Wastes of material, labor, power and all similar sources of loss have been and are daily being eliminated by carefully arranged and amply proven plans and the ceaseless vigilance of the administrative force from the head of the establishment down through the operatives, all of whom participate, not only in the cares and the responsibilities incurred thereby, but in the rewards of good salaries, premiums for special efforts and the satisfaction and "esprit de corps" which comes from being a part of a commercially and mechanically successful organization.

Necessity for System.

It should not be forgotten that system, some kind of system, is necessary to any business however great or small. The system may be very simple and require but meager facilities for its operation, or it may be very complex and require a large expense and many persons to properly operate it, yet the one will be a system as much as the other.

Any kind of a business must have some kind of a system if its manager or owner expects any reasonable degree of success. There must be some recognized method of transacting business whether it is recognized as a system or not.

If the system is one which permits carelessness and waste the business suffers to a corresponding extent.

If the system of organization of the supervising and the working forces is such that there are clashes of authority and constant friction in the daily routine of business, much dissatisfaction will be the result.

If the methods of operation under the system are inefficient to perform their proper functions, the work done under its regulations will probably be inefficient also.

If the system is so elaborate and complex as to require an unnecessarily large expense in its installation and large force to operate it, the results may be that the system will cost more than its good effects are worth in the business.

If the system is unnecessarily complex its provisions are likely to be imperfectly performed, or performed in a perfunctory manner and the whole plan be burdened with what is usually known as useless "red tape."

What is usually referred to as "too much system" is frequently found to be so much complexity as to produce confusion in the minds of those having charge of its administration. The difficulty is not too much system, but too much *complication,* and not enough *system.*

Again, the system may be one that would be perfectly adapted to a certain kind of business, but not at all adapted to the business for which it is being used. The right thing used in the wrong place rarely succeeds.

The vast importance and value of a well planned and methodical business system is hardly to be measured in dollars and cents.

To meet the requirements of the business man who has to hold his position with the sharp conditions of competition prevailing at the present time any method or system must be able to demonstrate its actual value and practical usefulness to the business, or it is soon cast aside.

Most systems are susceptible of a certain amount of development in their practical use by men competent to discern and judge fairly of their practical usefulness. But the best system can soon be destroyed by careless and purposeless experimenting and changing. To the novice in this business there seems to be a constant temptation to change the forms, or the methods in minor points, to "tinker" with the system. When this is permitted the system soon loses its individuality, purpose and efficiency. It soon becomes "a thing of shreds and patches," without order, force, method or sustained purpose, the men engaged in its administration become confused in their duties and in the methods of performing them, and the manager dissatisfied with the results of the now dilapidated and useless system.

In sharp contrast with this is the well planned and orderly system, administered by a man well trained in this particular business, assisted by a corps of bright and ambitious clerks, each knowing perfectly every duty expected of them, working without friction and with clock-like regularity and precision, producing valuable and accurate results with every operation performed, and having at hand every item of information that may be desired by the managing officials, and being able instantly to locate, and give the necessary information to correct every waste of labor or material, whether it is in the storing and issuing, the transporting or the machining of material and machine parts or the assembling and erecting into a complete machine, and to discover and report every instance of extravagance of purchasing stock, material or tools, for manufacturing; every item for supplies for office or shop and every instance of an unusual rise in the general expense, or overhead burden, whether it arises from the accounts for supplies, operating, maintenance, insurance, advertising, selling or other source of this long list of general accounts that are often so difficult for the manager to keep within reasonable and economical limits.

Often as a prerequisite to the elaboration of a plan will be a careful preliminary investigation of the *conditions* and environment under which the enterprise must be carried on, since circumstances and conditions are most important factors to the success of any plan, and must be taken into careful consideration in deciding upon the essential features of a plan.

To illustrate. In planning a campaign the general must consider the force, the arms and resources of the enemy, and set these against those of his own army, since these may in a large measure decide whether he must plan for an offensive or a defensive campaign. He must consider the positions of the various corps, divisions and detachments of the enemy, their defensive works and the nature of the intervening country since he must weigh all these matters carefully in making his plans and in determining the disposition and location of his own troops. And all this must be done in accordance with certain well defined rules and maxims in the science of military strategy.

Conditions to be Considered.

So in the establishing of manufacturing industries there are many preliminary conditions to be taken into account, and all of them must be carefully considered at their true value and importance in determining the general features of the plan. We must look over the field and note with what competitors we must contend; we must know where our material is to be obtained; what are the transportation facilities for bringing it to us; what are the market conditions for our product; is there any available and proper site upon which to erect the buildings of the plant; are there men conveniently available to operate our plant with such a degree of efficiency that we may successfully compete with other manufacturers in the same or similar business; and so on through a long list of important conditions.

Having decided upon the essential features of the *plan* the next duty in

order will be to formulate a *system* sufficiently broad and comprehensive to provide for properly and successfully administering and managing the proposed manufacturing plant. A properly formulated and matured system should provide ways, means and methods for accomplishing many things, of a wide and varied character. Among the more important will be the following characteristics:

Definition of System.

1. System as applied to business affairs consists of the rules and regulations which are worked out and adopted as the governing laws of all actions, events and functions of the establishment, including the administrative and operative force.

2. System, by its proper application and use, determines all minor as well as important matters connected with the daily routine of the plant, in its internal affairs and in its relations with outside parties.

3. System fixes forms, methods and values, defines duties, limits authorities and fixes responsibilities.

4. System defines all powers and limitations and marks out a clear and exact path for every man from the head of the establishment down to the most humble workman.

5. System prescribes what records, information and accounts are required in every department and provides for the details of the forms and the duties necessary to satisfy these requirements.

6. System provides the plan for conducting every department, division, section and office of the entire establishment, prescribing its organization, control, authority, duties and responsibilities of its administrative, clerical and working force, and the daily routine of its work.

7. System prescribes the means for ascertaining and exhibiting the exact condition of the work of each department as a whole, and of every job, order and piece work in it.

8. System regulates the methods by which we know the original cost of the land, the buildings and the equipment of the plant as a whole, and of that portion which is assessed to each department.

9. System gives us the means of knowing the cost of power, heat, light, insurance, depreciation, and maintenance of the entire plant and that of each component part or department constituting it.

10. System furnishes us with the amount of operating expenses of the plant in all its parts, and as a total expense of all kinds and for all purposes.

11. System provides means for ascertaining the material that should be purchased, the material that has been purchased, the amount that is used, and that which *should* have been used, on every piece of work that is being done in certain departments, or in the entire plant.

12. System points the way to ascertaining the cost of labor in any one or all departments, and the amount expended for any one purpose, account, or individual production order.

13. System shows us the cost of every individual part of every machine we are building or have built in the past, as well as certain designated groups of parts, and of the machine as a whole, properly assembled, erected, tested and inspected, ready for sale to the customer.

14. System gives us the various items of manufacturing expense or overhead charges and provides methods of distributing these expenses equitably over the costs of the product turned out.

15. System prescribes the office methods for the correspondence of the establishment with outside concerns, and for its indexing and filing so as to render it convenient for instant reference.

16. System gives methods of accounting by the usual account books, books of record, by the newer plans of loose leaf books, and by the flexible and convenient card methods, and similar devices.

17. System provides for the methods of indexing, and filing regular documents, special information, technical literature, and all similar important data and matters for future reference.

18. System includes methods of organizing and managing the sales department of the plant, showing the best plans for marketing the product of the plant.

19. System shows what prices should be charged for the product of the concern in order to, on the one hand, manufacture at a profit, and on the other to successfully compete with other manufacturers in the same business.

20. System covers advertising and publicity methods, by the use of periodicals, circulars, letters, etc., and the "follow up" methods necessary to such work.

21. System provides the sales manager with methods for extending credit to customers, making collections, and generally handling these often delicate and important matters.

22. System shows how the shipping department should be organized and conducted, what kind of blanks are necessary and how to use them, as well as how to handle the freight and express matters connected with the work.

However well planned and carefully formulated, we may not usually expect to produce a perfect system. The system may attain to that distinction by development along the original lines upon which it was planned, but as there are individual and local requirements in an endless variety in every manufacturing business, and new ones frequently being developed, it logically follows that "ready made" systems are generally of but little practical benefit.

Correct Diagnosis Essential.

The physician has the advantage of many costly medical books written by eminent men in the profession of medicine and therapeutics, of anatomy and physiology, from which he may learn all the great truths of the science to which he is devoted. He may have had the training of the best medical schools of this or any other country and have graduated from them with the highest honors. But with all the technical knowledge which this ample preparation gives him he will not at once determine and designate the disease with which the patient may be suffering. He will first make a careful and thorough examination and from the conditions which he finds present, he will generally make his diagnosis, upon which to base his system of treatment. Frequently, however, he will continue for days to observe the development of the malady before determining upon a diagnosis upon which he is willing to base his professional judgment and reputation. If he were to decide in a moment upon the ailment of the patient and prescribe off-hand his "celebrated cure" for this or that disease, we should be likely to call him a quack.

The well trained and eminent physician has no "ready made" cures and no "cure-all" medicines. He fully realizes that no two cases are alike, and no two persons suffer from exactly the same set of symptoms, or develop the same disease, in name, in exactly the same manner.

So it is in formulating a proper plan or system for the conduct of manufacturing operations, whether it be for administrative, commercial or productive purposes. There is an endless

variety of conditions and circumstances, each of which may be an important factor in determining some part of the system, or the form of some order, card, account or record that may be vital to the success and truthfulness of the results attained.

Like the experience of the physician, the case must be carefully studied in all its diversified manifestations and conditions in order that we may be able to make an intelligent estimate of the nature of the case and commence to formulate a plan upon which the system may be developed.

We must obtain a very clear conception of the results which we wish to accomplish before we can hope to formulate a plan for accomplishing them. Thus, if we are to formulate a system for an existing plant, turning out and selling the product, we must institute our investigation on quite different lines from that which would be the case if a new plant was being planned for.

Method of Procedure.

In the first instance it is necessary to obtain a plan of the buildings composing the plant, with detail plans showing the different departments and their relation to each other, and specifying the product or kind of work performed by each.

The cost of the land and the buildings and the expense of insuring the buildings, and of their maintenance in serviceable condition must be ascertained.

The system for the generation and transmission of power must be known, as well as the means of lighting and heating the various buildings composing the plant.

The facilities for the transportation of material and stock in the process of manufacturing must be examined and their adaptability, convenience and capacity determined.

The equipment of machinery designed for handling the work in progress will call for a very extended and careful examination and much study, in order to determine the adaptability of the equipment in each department for the work assigned to it and its capacity for handling its due quantity of the work.

The working force should be carefully canvassed as to its strength, quality, distribution, efficiency, and the methods that have been in use for its proper control and supervision.

The methods for recording and accounting for the time of the workmen, and of charging the time to different production orders or accounts should be looked into carefully.

The wage systems by which the men are paid will need to be investigated and noted as to whether they are paid on an hourly or day work plan or whether they work by a piece work method, a premium plan or by the bonus system; or whether more than one of these plans are in use.

The methods of purchasing, storing, issuing, and accounting for material must be ascertained, since these are very important matters in planning for the conduct of a manufacturing plant.

The methods of assessing the overhead expenses are very important. Many widely differing methods are in use for this purpose and as they are seldom quite correct in their premises or deductions the results are in a great measure unsatisfactory and misleading.

As the success or the failure of a manufacturing enterprise is often due to the methods by which the overhead burden or manufacturing expense is accounted for and apportioned, a great deal of care and expert judgment is necessary in correctly solving the problems connected with this department of the system of accounting and management.

The system employed for originating and issuing production orders, which furnish the manufacturing department its authority for its daily work is another matter of importance to be considered and must be carefully looked into.

The methods of passing these orders through the various manufacturing departments and of tracing the progress on the work which they represent will need serious attention, as there is frequently much loss of time if the system by which this is done is defective and its administration is inefficient.

Shop and Office Methods.

This will necessarily lead to the methods employed for routing the work through the several departments from its condition of raw material to that of the finished product ready for storage or shipment.

The methods in use in the general office, including correspondence, book keeping, accounting, indexing and filing, mailing and the expense of supplies, traveling, litigation and similar matters affecting the general expense or overhead burden should be looked into carefully.

The sales department and its methods of advertising by periodicals, circulars, letters, catalogs, etc., and the methods of estimating, following up inquiries and customers, making and recording sales, extending credits and making collections will be subject to investigation, since the efficiency and economy with which all this work is done will materially effect selling expenses and therefore the percentage that must be added to the product to cover these costs, and finally fix the market price of the output of the establishment.

By the above it will be realized that the preliminary investigation necessary to put the technical expert in possession of the facts upon which he may plan a comprehensive, practical, and efficient system is a very important proceeding and that much of the future success of the proposed system will depend upon the thoroughness and ability with which its duties are performed.

Having gotten the required information upon which to base a plan for a system it next becomes incumbent upon the expert to formulate the plan, of which the limits of this article will not admit a detailed discussion. However, some interesting phases may be illustrated and described.

Use of Charts.

The use of graphic charts for showing the real and comparative conditions of the various manufacturing and commercial accounts of the various departments, and of the entire plant as a whole will be very important. The one shown herewith is similar to those in use in some of the largest manufacturing corporations and the most extensive railroad systems in this country.

In the graphic chart shown is given the conditions of the expenses for material, labor, the overhead expense and the totals of these three principal cost accounts. In this chart the horizontal lines represent the amounts in dollars, as indicated by the figures at the right and left sides of the square.

The vertical lines represent time, and each space from line to line indicates one month. The twelve months of the year are shown, the names of the months being placed at the top of each line. By this means with horizontal lines representing *amounts* and vertical lines representing *time*, it follows that points upon the field of the chart, placed in a proper poosition to indicate the val-

ues in amounts upon each monthly line, and connected by lines drawn through these points, will correctly represent the *monthly fluctuations* of these amounts, or in other words show the *relation* between time and cost so that we may, at a glance, compare the results of one month, or series of months, with the results of any other month or series of months of the year.

Interpretation of Chart.

The first, or heavy dotted line, beginning at the lower left hand base of the chart, shows the cost of material used, month by month. By tracing this line we find a slight rise in these costs during the months of January and February, and a sharper rise during the two succeeding months, March and April. After this point, the tendency is still upward until September is reached, when there is a slight decline during the month only to encounter a very sharp rise during the month of October. November shows a compensating decline, closing the year at a point about equal to that in the first of October.

The third line from the bottom (a solid line) represents the fluctuations of labor for the year. There is shown a slight rise during January, followed by a somewhat greater decrease in February. From this point the line follows quite closely the fluctuations of the line of material costs, except that the rise is continued through September, after which it follows the rise and fall of the material line, except that the rise in October is not nearly as much, while the close of the year shows a relatively higher point than that of material.

The second dotted line gives the overhead burden. Upon tracing this line it will be noticed that there is a slight rise in January, but a corresponding drop in February, while the manager seems to have located the difficulties and the result is a still sharper drop during the month of March. This, however, was not maintained during the month of April, but a slight rise took place, which was promptly recovered in the month of May. From this point there is a slight though gratifying decrease until October, from which point the expense rises somewhat till the close of the year, but still shows at the close over $2,000 less monthly expense than at the opening of the year.

The totals of the amounts shown by the material and labor lines added will give the "flat cost" at any monthly period of the year. The totals of all three lines, namely: first, material; second, overhead burden; and third, labor, will give the total factory cost, which is shown by the upper fourth line, which, with the exception of the first two months follows quite closely the fluctuations of the labor line, although from the nature of the case the fluctuations are more pronounced.

Lesson Taught by Chart.

What are we to learn from the examination of this chart? First. There has been a steady increase in labor costs, from which we infer that more workmen have been employed. Second. The increase in the cost of materials purchased confirms the idea that there has been an increase in the number of workmen to use up these materials. Third. These two conditions argue that there has been an increased output. Fourth. In consequence of the comparatively steady decline of the overhead expense we argue two conditions; (a) the material and labor cost having gone up while the overhead charge has decreased, means a relatively lower overhead charge per unit of production, and (b) an increase of output and a decrease of overhead expense, points to improved methods of management and increased efficiency of the plant.

All these are important facts to learn, and point unmistakably to the points where changes are required and improvements must be made. The questions of the output of the plant are handled in a similar manner and the results shown by graphic charts, as are also the selling expenses, profits, and many similar important matters. Very many of the statistics of the manufacturing operations are plotted in this manner, some of the most necessary ones being shown day by day so that the supervising officials are enabled to keep in close touch with actual conditions and results.

It will be noticed that in making up these charts, the amounts written at the right and left need not be the same in all of them. The horizontal lines are given different values according to the particular amounts to be represented on the charts. Thus the space from one line to another may represent 10, 50, 100, or 1,000 dollars, as may be necessary to show the results within the limits of the sheet. In the references beneath each chart should be given a key to the meanings of the different characters so that their purpose may be readily seen and understood. The curves formed by these lines showing gradual and easy fluctuations are very nearly what will usually result from good and economical management, and are valuable as furnishing means for comparing results month by month, as they give the results in a very striking and forcible manner, rendering it easy for the mind to quickly grasp their significance, and greatly assist the management in making such changes in the administration of the affairs of the concern as may be necessary to keep down expenses, prevent wastes, and increase the output and the profits.

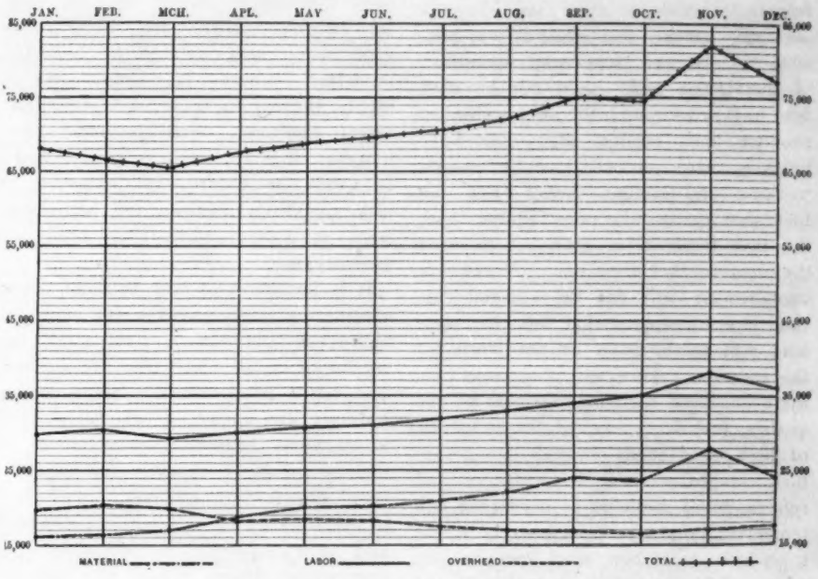


CHART SHOWING RELATION BETWEEN TIME AND COST.

RANGE OF UTILITY OF HIGH SPEED STEEL

By O. M. Becker.

When high-speed steels first came upon the market, the reports of their marvelous powers were received with incredulous astonishment. To cut steel at the rate of 100, 200, and even 400 or more feet a minute, almost as if it were cheese, seemed quite beyond the range of probability, not to say possibility. The actual performances, however, left no room for doubt that they would play an important part in the machine shop within the following few years, as indeed has now come to be the case to a much larger extent even than was at first dreamed of.

The first high-speed steels very naturally had defects which limited their usefulness, as well as their use. It was seen very quickly that while it was possible to remove surprising quantities of metal, the tools could not be used for fine work, it being impossible to produce keen cutting edges suited to finishing work on metal, or to woodworking and similar uses. From the fact that many who are familiar with the new steels seem even yet to have the opinion that they can be used advantageously only for heavy metal cutting, it would appear that this characteristic still marks some of the steels on the market. However that may be, there has been such improvement of the quality, that is to say, of the structure, of high-speed steels through changes in their composition and the perfection and refinement of methods of hardening and tempering, that there is scarcely a use to which a carbon steel can be put where a high-speed steel tool will not only do more, but in most cases better work, provided, of course, that the machine in which the tool is used is as well adapted to the latter as in the former case. This may seem a trifle strong. There are manufacturers of high-speed steel, however, a number of them indeed, who unqualifiedly guarantee to replace any carbon tool whatever with a high-speed tool, at a distinct saving to the user. However much their confidence may be justified, it has been demonstrated beyond question that high-speed steel tools, despite the high cost of the material, compared with carbon steel, are more economical in four out of five jobs, generally speaking, in the metal working industries; and in even a larger proportion of cases in other industries where cutting tools are required.

Obviously alloy steel is peculiarly adapted to all operations where it is necessary to remove large quantities of superfluous metal, and to machine material so hard as to be quite beyond the power of ordinary tools, though it does not necessarily follow that in jobs of this sort it works at its greatest efficiency, as may be seen hereafter. In some shops of course this sort of work is comparatively large; but in the average shop such operations form but a small proportion of the work. The real test of the utility of the new tools is in their economical applicability to the multitude of ordinary jobs, for the execution of which ordinary tools have heretofore served very well.

The Most Suitable Conditions.

It must be quite evident that what has been said refers mainly to tools used for cutting. There are, however, a good many uses, as will be indicated hereafter, where high-speed steel is highly efficient in tools of a very different character. For the most part, however, it is applicable to cutting tools. It would be absurd, for example, to make a sledge hammer of high-speed steel, at present cost, if intended for ordinary use.

It is important to bear in mind, when considering the relative efficiency of high-speed and carbon steel tools, the conditions under which they are worked. The latter have this advantage, under ordinary circumstances, of being used in machines designed with reference to their particular limitations and capabilities. The former, however, unless used in machines of the newer types, designed and built especially to withstand the tremendous strains and to give the extraordinary speeds and feeds applicable in the case of high-speed tools, cannot in the nature of the case work at their highest efficiency. The high-speed tool must be used in a high-speed machine, in order to develop its powers and show its relative value as a tool. Under such proper conditions, there can be no question whatever of the superiority of high-speed tools over ordinary ones in all cutting operations at least.

In the case of heavy cutting, and the removal of large quantities of metal, the new tools are of course pre-eminent. But the question may well be asked, why should it be necessary to remove large quantities of metal, except possibly in a few cases where it is impossible to forge or cast nearly to the required shape? As a matter of fact it is cheaper to do it in very many, if not in all cases. Take as an extreme example, the making of a very large crank shaft. It is scarcely within reason, under present conditions in work shops capable of handling work of such magnitude as a 100 or 150-ton forging, to work such a piece down under the press or hammer to the required dimensions and form. The forging ends with the rough approximation of the finished form and dimensions, and the machine tool does the rest. Even the tong-hold or porter-bar is drilled off.

For a long time it has been understood in well-regulated shops that it is much cheaper to manufacture pieces duplicated in large numbers from bar stock, rather than to first forge, when the amount of metal removed is not great, compared with the size of the piece. Now that high-speed steel is available, it is demonstrated that the same thing is true where it would be necessary to remove a great deal of metal. A specimen job is shown in the annexed figure. The hatched portion shows the metal cut away from the bar stock. It is seen to be considerably greater than that remaining in the finished piece—two and a half times as great, indeed; for the weight of the part before finishing is a little greater than 117 pounds, while after finishing it is but 34½ pounds, the chips removed weighing a trifle over 82½ pounds. Even with this great waste of material the cost of producing this particular piece has been considerably reduced by omitting the forging, and rapidly reducing from the bar with a powerful lathe. The milling operation at the end, of course, is the same as it was when made in the old way.

In jobs such as form the ordinary run of work in factories, the design of parts naturally avoids, as far as possible, such forms as require a great deal of forging or cutting; and cases like that just taken are comparatively rare. There is on this account usually a good margin between the cost of forging and finishing, and finishing directly from stock, in much of the work going through any particular shop.

High-Speed Steel on Castings.

In the case of iron and steel castings it is of course about as easy and cheap to mold close to the required size as not to do so, and ordinarily there is little, if anything, to be gained by heavy cutting. In the case of light castings, however, or those of unusual form, which are peculiarly susceptible to warping, it is often desirable to mold large enough to allow for all possible deformation, and then to remove the excess metal by machining. So also drilling holes, even large ones, is often more economical than coring and reaming them. There has been a great deal

of questioning the utility of high-speed tools on cast iron, it having been widely asserted that the new steels would not work any better than carbon tools, if as well. Whatever foundation there may have been in past experiences to warrant such conclusions, there is no longer any ground for doubting the utility of high-speed steel for cutting cast or malleable iron. It is no extraordinary performance at present to take a 3-32 x 3-32 roughing cut on gray iron at 60 feet per minute; and a finishing cut 1-32 x 5-16 at 100 feet per minute; though possibly this is not exactly a regular thing in shops as yet. High-speed steels of today cut cast iron as freely and smoothly as they do steel, though indeed the same speeds are not attainable.

Even if there be no occasion for heavy cutting power, or for increased speed in light cutting or finishing jobs, there is a positive advantage in the use of high-speed tools for this purpose in that the cost of tool and tool maintenance is materially reduced. The first cost of a tool is usually held to be a matter of high importance; whereas it is, except only in the case of special tools, when but a few pieces are to be produced, but one of several things to be considered, and not necessarily the most important of them either. The only rational basis for computing the cost of a tool (this is one of the two or three items going to establish the efficiency of a tool) is the cost per piece satisfactorily finished. Obviously, then, the first cost may even become negligible. A much more important consideration than first cost is maintenance cost, which of course depends in large part upon the endurance of the tool, which is to say its capacity for continuously doing work accurate within the required limits. The principal consideration affecting tool cost then is maintenance, first cost being quite secondary.

Cost of Tool Maintenance.

To maintenance is properly chargeable the time required for removing the tool from the machine, putting it into condition suitable for proper work, grinding or dressing, the time lost by reason of the machine being idle, and again setting up in the machine. Evidently the longer a tool continues satisfactorily at work, the lower the maintenance cost, not only in the absolute, but relatively to the pieces finished; and consequently the greater the efficiency of the tool. Considered in this way there will be found few jobs in the ordinary shop in which high-speed tools cannot show a distinct advantage. Let us see how this works out in specific instances. The following data could be duplicated many times, in their essential features, in almost any shop, and are therefore typical:

Tool.	Pieces per grinding, etc.	Time for grinding, etc.	Total pieces finished.	First cost of tool.	Cost of time per hour.
Carbon	50	5 min.	1 000	$0.25	$0.20
High speed	300	5 min.	10,000	0.75	0.20

From these data the following comparisons are drawn per 100 pieces finished:

Tool.	First cost.	Cost of maintenance.	Total cost.	Saving, H. S. over carbon.
Carbon	$0.025	$0.033	$0.058	....
High speed	0.0075	0.0055	0.013	78%

Putting the result in a different form, the first cost and maintenance of a high-speed tool on this particular (but typical) job is but a little more than one-fifth that of a carbon steel tool—and this without any change whatever in speed or feed, the whole gain being in the greater endurance of the tool. With an increased speed or feed, or both, of course the efficiency would have been still greater.

There is a growing disposition to make use of chilled rather than sand molded castings for a variety of purposes. The difficulty of machining such castings has heretofore prevented the extension of their use except in rolls and wheels, and a few other parts where their use could not well be avoided. Chilled rolls have indeed been turned with the best of tools and at an extremely slow rate; but further than this, little has been possible. With high-speed tools of proper form it is comparatively easy to rough down rolls and similar parts to cylindrical, and even to circular and spiral grooved forms. For reasons not well understood, high-speed steel is apparently not so well suited to smooth finishing chilled surfaces, Hadfield (manganese) tools being customarily used for scraping to secure the finish surface, or this being done by grinding. The ordinary forms of tools are quite inadequate for the turning of chilled pieces, and it is necessary to use a special form of cutter.

Gains in Reciprocating Machines.

The inherent weakness of reciprocating machine tools, the stopping at the end of each stroke and the return for another cut, for some time tended to prevent the use of high-speed tools in connection with them. There have been developments however which make their use in machines of this class almost if not quite as desirable as in the case of rotating tools or work. Even if there were no advantage gained in speed or cut, the same reasons which make high-speed lathe tools desirable even where increased speed is not desirable or attainable for any reason, apply to planer, shaper, and slotter tools also, though possibly to a somewhat less extent. The time gained in grinding is somewhat less, though the real tool cost measured as already described, is relatively the same.

As a matter of fact however there is, in the newer machine tools of these types, a very considerable gain in speed, to say nothing of the possibility of increased cutting power. These machine tools, mostly of the recent rapid stroke and quick return design, require high-speed tools, in order to work at their highest efficiency. A speed of 80 feet per minute has been attained effectively, while 40 to 60 feet per minute, on steel, are no longer considered remarkable. It might be expected that the jar attendant upon the tool beginning a new cut following each return would very largely increase the wear of the machine. This might be true if the latter were lightly built; but in the case of properly designed and constructed machines the effect is unimportant. It is to be remembered in this connection that the power absorbed in high-speed cutting is by no means proportional to the increased amount of work done. There is more likelihood that the tool will snap off with the shock of the impact, though this cannot happen if it be of suitable proportions.

It is the regular thing in one shop to plane certain tough steel forgings under unusually difficult conditions at the rate of 40 feet per minute, cut ¼ x ½ inch; and to rough plane cast iron plates 12 x 23 inches in six minutes. The finish cut takes half as long. All this on a 36-inch planer. A 24-inch machine of the same design has been run at a speed which reduced the labor job on which it is regularly used from 30 to 8 cents per piece, at the same time increasing the former output of 9 to 12 pieces to 40 to 55 pieces. Such a quadrupled efficiency cannot be expected as a regular thing. Even the doubled output guaranteed by one machine maker is worth considering however.

Milling Machines And Rotary Planers.

The evident tendency of the milling machine and rotary planer to supplant reciprocating machines has been accentuated by the new steels, whose efficiency is not subject to the same limitations in the form of a rotating tool as in the reciprocating form. All that has been said of other forms of high-speed tools with respect to their superior efficiency holds true of milling and other rotary cutters, possibly to a still greater extent even. As with other tools, the lasting quality, the decreased amount of sharpening required, is an important item—more important even than in the case of lathe and similar tools, because of the higher cost of sharpening. The important gain however, is usually in the greatly increased feed allowable with high-speed cutters. An increase in speed also is permissible; and while advantage is often taken of this, the best practice, in milling operations, seems to be to increase feed rather than cutting speed. This on all classes of iron and steel. For this reason it is necessary, in designing these tools, to allow increased clearance to the cutting teeth and to reduce their number below the customary in carbon steel cutters of similar size. The design of these and other tools is considered elsewhere; so that it remains to point out here merely that usually, especially in the case of those mills with narrow faces, inserted cutters allow the manufacture of a comparatively inexpensive tool in all diameters over say 4 inches. The body once made, serves for an indefinite number of cutter sets. In smaller sizes than that mentioned it is usually desirable that the cutters be solid.

A single typical case will indicate the efficiency of high-speed milling cutters compared with those of carbon steel. On cast iron a 3½ inch cutter, 19 spiral teeth, cuts at a surface speed of 82 feet per minute with a table travel of 27 inches per minute, and mills 6,800 linear inches at a grinding. The best results previously obtainable under similar conditions were 1,300 inches to a grinding, at a table feed of only 15 inches per minute. The carbon tool required grinding once a day, whereas the high-speed cutter runs five times as long, finishing about 1,360 pieces to the 270 pieces formerly finished per grinding. It was possible to reduce the labor cost from $1.40 to $1.10 per hundred pieces. Besides, there was the saving in the cost of grinding amounting to $0.11 per hundred pieces, making the entire saving $0.41 per hundred pieces, or enough to pay for the first cost of the new tool in a week or less. In addition to this, the tool itself has an almost indefinite life, outlasting from 5 to 20 carbon steel tools; so that considered merely with reference to the first cost and total amount of work done, the high-speed cutter is only one-fifth to one-twentieth as expensive as the other.

Accuracy of form and long life are especially desirable, and indeed essential, in involute or gear cutters and other formed cutters. The advantage of high-speed steel for tools or these types is so evident as scarcely to need mentioning.

The efficiency of high-speed milling cutters when working on refractory material has been repeatedly questioned. It is safe to say that any such question must be due to unfortunate and unnecessary experiences. Such milling cutters are successfully working on material as refractory as nickel-chrome steel armor plate, and that at a rate as high as 75 feet (peripheral) per minute. Working on automobile parts even more refractory, high-speed cutters are found to last three to five times as long as carbon steel cutters on the same work, and do it equally well, while the feed is increased a third or more. There is no difficulty whatever in the tools standing up under the work. It is merely a matter of correct design and proper hardening to meet the requirements of the case.

Improvement in Drill Performance.

Next to lathe tools it is in drills that high-speed steel has most fully justified itself. In the up-to-date shop, drilling operations have been as much changed as have the turning operations, and in many cases even more so. Speeds, and more especially feeds, have been increased, heavier machines are required, and multiple work changed from punching to drilling where that has been possible. In putting holes through plates especially, plates where the distressing of the material involved in a punching operation is sought to be avoided, the drill is now taking the place of the punch. Such plates can be stacked and the holes drilled as quickly as they can be punched—and in some cases more economically even. The result is a better hole, if nothing else be gained. In agricultural and other machine castings where it has been customary to core holes and then ream them out, in many cases it is now less expensive to omit the cores and drill the holes from the solid. The result, generally speaking, is a more accurate hole, even when there is no direct economy in labor cost.

It may be questioned if there be any considerable economy in the use of very small drills, say under ¼ inches. There is not enough metal in sizes smaller than this to withstand the rough usage which may freely be given larger drills; and with speeds and feeds much increased there is likely to be considerable breakage. Nevertheless there have been obtained some striking results with these small drills, and they are made for sale down to ⅛ inch and less. A ¼ inch drill has been run continuously in mild steel at the rate of about 1,100 revolutions per minute with a feed of 0.008 inch per revolution, without breaking down; and in gray iron, somewhat faster. The rate agreed upon by common consent for carbon steel drills under similar conditions is about 220 revolutions per minute with a feed of about 0.005 inch per revolution. Stated in terms of peripheral speed the ratio is 826 to 176, or about 4.5 to 1. The same ratio can be maintained easily throughout the larger sizes also; and when it is remembered that the allowable feed is practically doubled, it is seen that the amount of metal removed in a given time is in the ratio of nearly 10 to 1. This looks big; very big. The actual economy however is not necessarily in proportion to the ratio with which metal is removed, for the labor cost is dependent upon a number of other factors also—the time lost in handling the pieces and in keeping the tool and machine in a state of efficiency chiefly. In operations involving the boring of many shallow holes and many changes of pieces therefore, that is, where the actual working time of the drill is short compared with the whole time devoted to the place—the chief gain is in the longer life of the tool and the time saved in keeping it sharp.

Breakage of Drills Unnecessary.

The excessive breakage of high-speed drills sometimes occurring in structural forms, and boiler plates, and similar high-carbon plate work, is not at all necessary. It occurs most frequently because drills used are not adapted to the work in hand. Drills for this purpose should have a very tough temper and very smooth finish, and usually are better if twisted from rolled stock rather than milled from the round. Another cause for such

breakage is the insecure holding of the several parts of plates when holes are being drilled through several members at the same setting.

In passing it may be of interest to mention that in many kinds of work flat drills are just as efficient as the twist variety—in gray iron they are found frequently to be slightly more economical. In steel forgings the twist drills are considerably the more efficient however. Straight grooved drills made from round stock are also quite efficient, though not quite as cheap to manufacture as the flat style Of course the efficient use of drills of these forms involves accurate and correct grinding, just as in the case of twist drills.

(To be continued.)

A NEW USE FOR STEEL

Steel Arch Centering in Concrete Bridge Construction

The use of steel for centering concrete arches is interesting, not only because of the fact that it is a new departure in concrete bridge construction, but also in that it constitutes another use for steel in a day when it might be thought that it had already been put to every conceivable use.

Up to the present time, timbers have been used universally for this purpose, but the success attained in the use of steel centering as exemplified in the bridge now being constructed over Rocky River in Lakewood, O., a suburb of Cleveland, will undoubtedly lead to its adoption as the standard method of construction for arches of this character.

The 280-foot main arch span of the new Rocky River viaduct, which is the longest span of its kind in the country, and with the exception of a similar bridge under construction in New Zealand, the longest in the world, will be erected by means of steel centering. The contractors for this bridge decided that it would be more economical to use steel for centering purposes than timber, provided that the steel so used could be incorporated in the construction of the bridge itself when the centering was removed. Hence all the I's which are used for cross-beams, stringers and joists in the centering structure, were selected so that they can be used in the finished structure as floor beams for the street railway track, which is to be placed between the two ribs of the arch. A further advantage to be derived from its use, is that it will provide clear water way for the passage of ice, thus eliminating any danger of the destruction of the arch center by ice in the river. The use of timbers for centering, which is to stay in position during the winter, would necessitate a heavy superstructure that would completely block the channel, receiving the full force of the impact of huge masses of ice carried by an appreciable current.

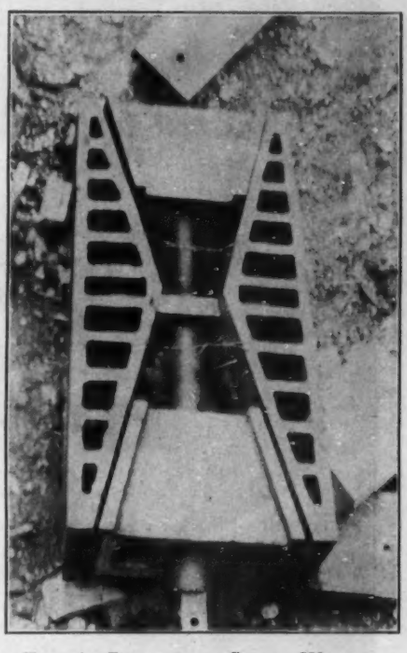


FIG. 1—DETAIL OF STEEL WEDGES.

This is by no means a small factor in this particular case, because of the fact that thousands of dollars worth of property is damaged every year

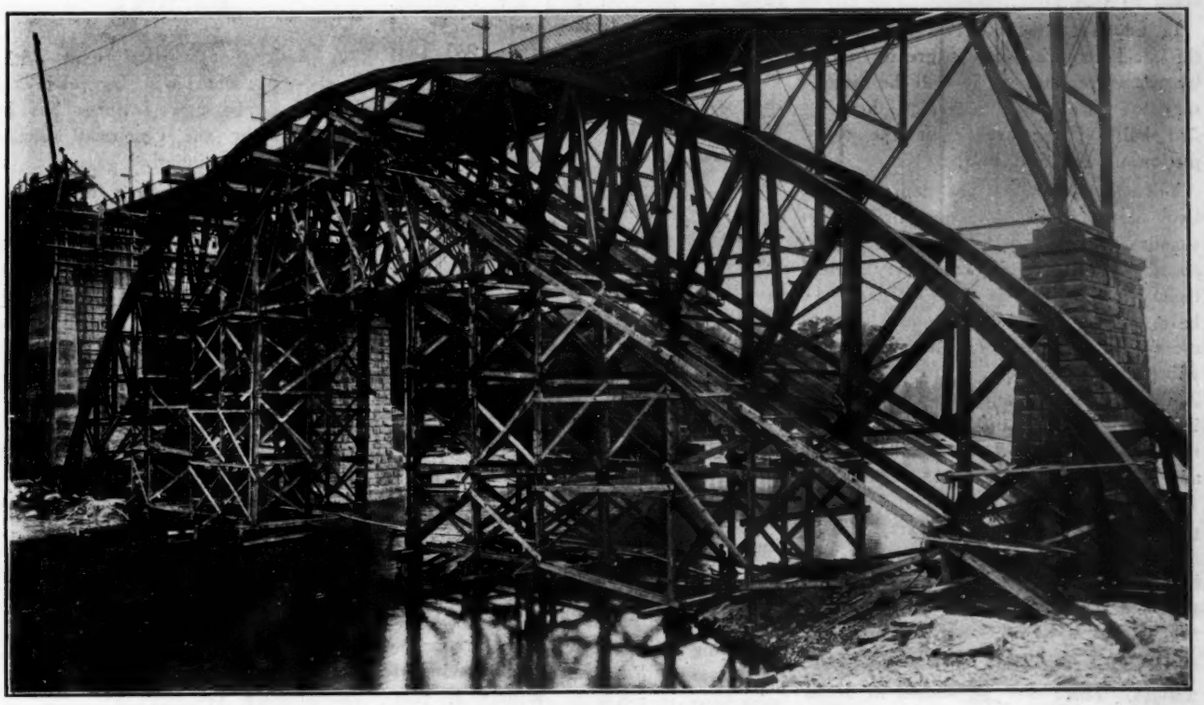


FIG. 2—STEEL ARCH CENTERING IN PLACE, RESTING ON WEDGES SHOWN IN FIG. 1.

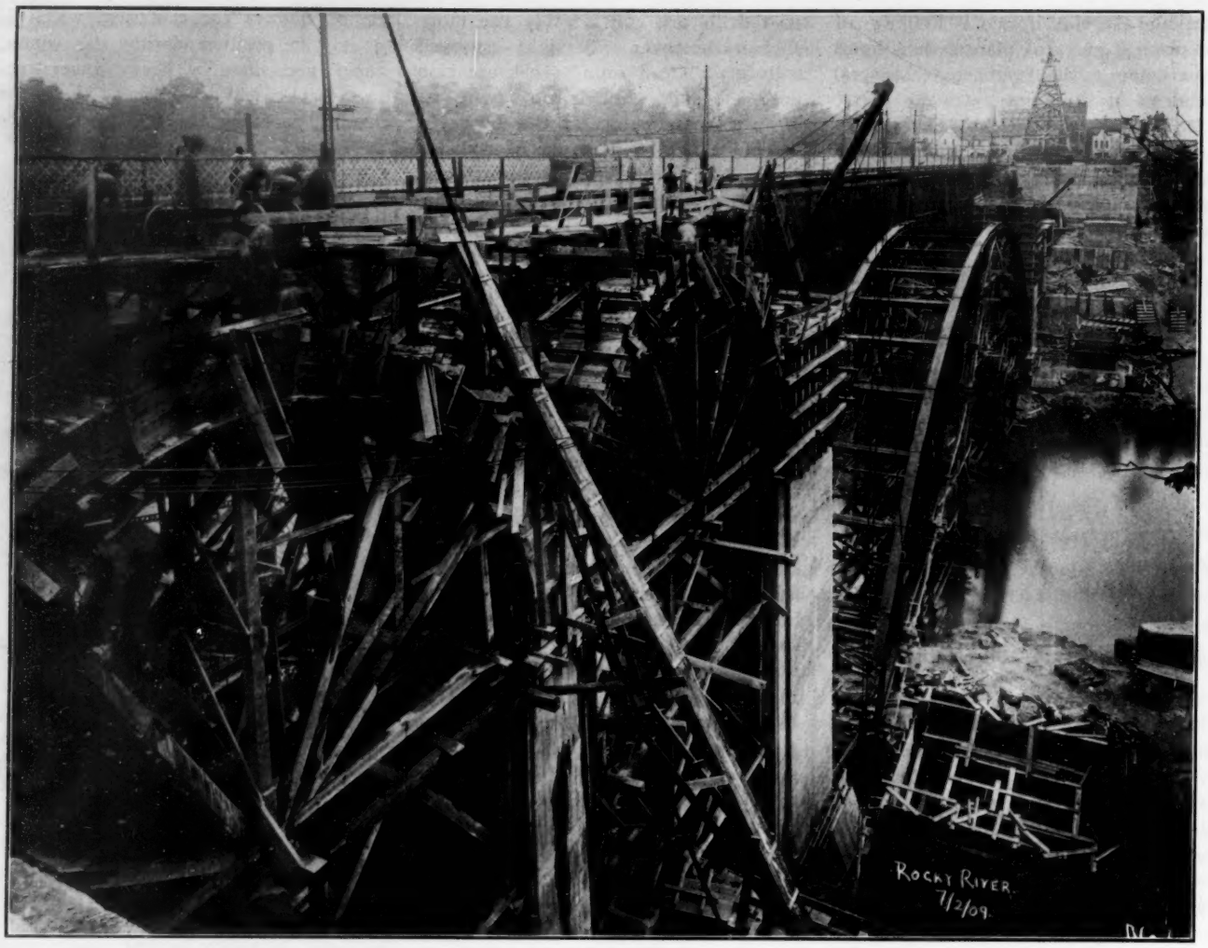


FIG. 3—VIEW OF ARCHES AND STEEL CENTERING FROM MAIN ABUTMENT.

by the breaking up of ice jams which form in this river.

In addition to these two advantages, the steel centering offers greater facility of movement, as it will be necessary to move these centers to the second half of the arch upon the completion of the first half.

These steel centers are composed of two parts, which form a three-hinge spandral brace arch with curved upper chord. This chord will carry cross beams composed of two 20-inch I-beams at each panel point. These cross beams will carry the stringers which are composed of four lines of 20-inch I-beams, and these stringers, in turn will carry the joists which run transversely to the axes of the bridge and carry the timber bows. There are four of these cross beams in each panel and the bows will carry 2-inch sheaving on which the concrete will be laid. The entire vertical weight of the arch is carried to the shoes. There are four sets of steel wedges, one for each shoe, each set composed of four wedges. These wedges, shown in detail in Fig. 1, are of annealed cast steel planed on all sides, faced and provided with a powerful screw for holding them in position and for lowering. Owing to the tremendous weight of these wedges, approximately 830 tons for each shoe, they would lower with this weight were it not for a screw which holds them in position. After the construction of the arch, the wedge will be lowered by unlocking and turning this screw and will then be jacked over into position for the construction of the second rib.

The steel centers require a very careful workmanship, equalling that done for permanent steel railroad bridges, with the exception that all connections are bolted instead of riveted, this being done in order to facilitate removal. As the compressive stresses greatly exceed the tensile stresses in practically all members of this trust, the bolting is not such an important matter as might be supposed, but it is very important that the butt joints should be planed to as perfect a bearing as possible. Photographs illustrating this article are by courtesy of *Concrete Engineering*, and acknowledgement is made to Wilbur J. Watson, C. E., Citizens building, Cleveland, for information obtained.

A NEW HIGH-SPEED DRILLING MACHINE.

A design of vertical drill with a number of what will be readily discovered to be new features has been put forth by the Cincinnati Bickford Tool Co., Cincinnati.

The machine has been designed for high speed and with high power for handling high speed drills and with low speed and ample power for tapping with quick backing-off speed.

The positive geared feed box which is located on the sliding head, and convenient to the operator, provides six feeds, graduated in thousandths per revolution of spindle as follows: 6, 9, 13, 18, 27 and 39, any one of which can be used with any speed of the spindle.

The friction back gear, shown at the top of the machine, can be left in continuous engagement, although a handle is provided to disengage it should the operator so desire when it is not required. The lever for manipulating the back gear is brought down on the left and near the front of the machine, convenient to the op-

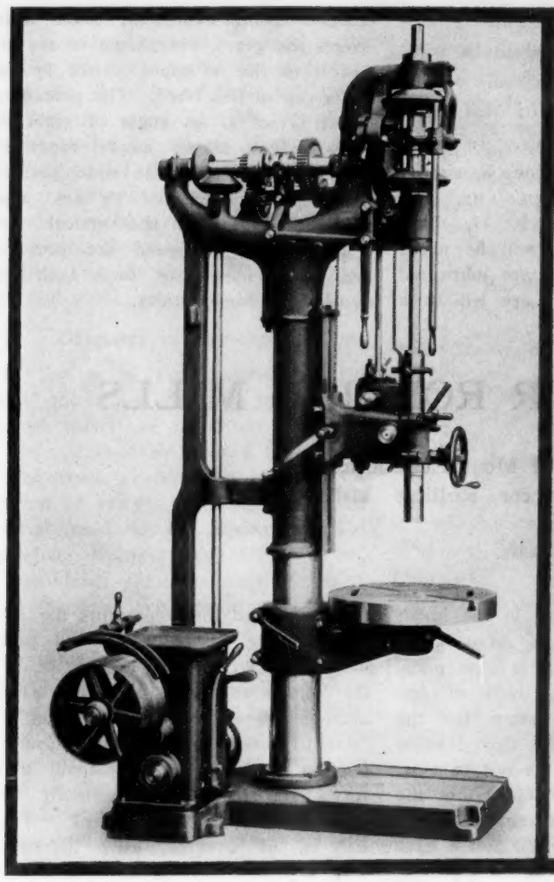


FIG. 1—BELT-DRIVEN HIGH SPEED DRILL.

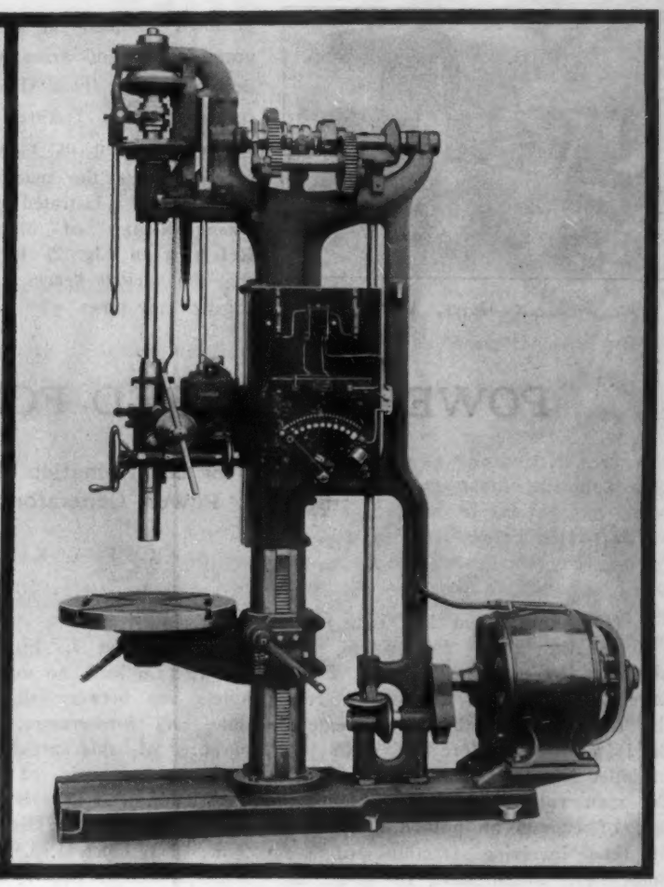


FIG. 2—VARIABLE-SPEED MOTOR-DRIVEN DRILL.

erator, and he can engage or disengage the back gear at will without stopping the machine, and this same lever, when brought to a neutral position, furnishes a stop to the spindle.

The gear box in the belt-driven machine, Fig. 1, is placed at the left of the base at which point the operator is able to make changes of speed without leaving his position in front of the machine. Eight speeds are obtained in this gear box and with the use of the back gear at the top of the machine, 16 different spindle speeds are available. The time consumed in making any change of speed is not more than three or four seconds. There are no frictions in the gear box, but it is of simple and substantial construction; is neat in design and fitted with detachable tool tray. In the motor-driven design the variable speed motor is mounted on the base of the machine, as seen in Fig. 2. The controller is mounted at the side of the machine and contains switch and fuses. It is provided with 18 different speeds, giving, in connection with the back gear at the top of the machine, 36 spindle speeds. Any one of these speeds can be obtained without the operator leaving his position at the front of the machine.

With either the motor or gear box drive correct spindle speeds for 70-foot cutting speeds per minute as provided for drilling, and a slow speed through the use of the back gear is furnished for tapping. When a tap has reached the desired depth the reverse is accomplished by means of the tapping attachment lever, releasing the tap at a slow speed, when it can be withdrawn four times as fast as when going in.

The machine is furnished with either circular or square table as desired, and is built in six sizes from 24 inches to 42 inches, weighing from 2,700 to 6,100 pounds.

NEW COLBURN 30-INCH BORING MILL.

We illustrate herewith a new design of 30-inch mill which has been brought out by the Colburn Machine Tool Co., Franklin, Pa. Many of the standard Colburn features will be readily recognized. The most radical departure, however, is in the arrangement of the main drive, which, as will be seen, is

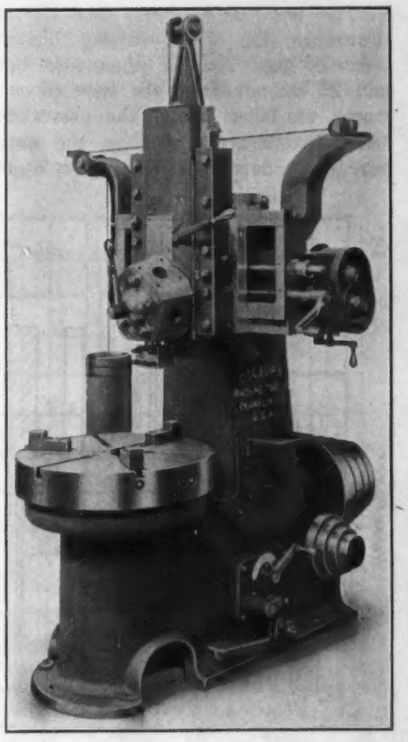


FIG. 1—COLBURN 30-INCH VERTICAL MILL.

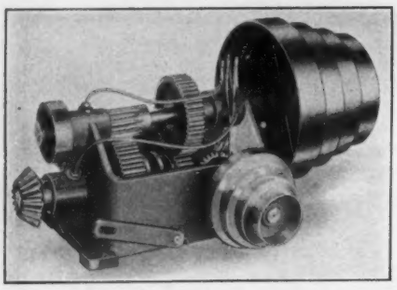


FIG. 2—MAIN DRIVE, WITHDRAWN.

mounted complete in an entirely separate casting and arranged to be withdrawn bodily from the rear of the column base, a feature of real value for examination or repair. In many other respects the machine is similar to the mill illustrated in THE IRON TRADE REVIEW of March 11, 1909. Referring to Fig. 2, it will be noted that the various bearings are lubricated through oil pipes which are led to a common point under the hood which covers the gears, not shown in the cut. Access to the oil pipes is had by lifting a cap in this hood. The pentagonal turret is set at an angle of eight degrees, which allows ample room for large tools to clear the slide, and the slide can be swiveled to any angle within 30 degrees of the vertical. Sixteen changes of speed are provided, and eight changes of feed, both vertically and horizontally.

POWER REQUIRED FOR ROLLING MILLS

Method for Determination of Most Economical Size of Power Generator for Rolling Mills

BY J. A. KNESCHE.

(Continued from last issue.)

Since the time for rolling one billet is 44 seconds, billet No. 2 will have to be entered 22 seconds from the time the first billet was entered or 1¼ seconds before the sixth pass of billet No. 1 is finished. In practice the man entering billet No. 2 could not, of course, be governed by units of time involving fractions of seconds. He would have to judge the time by the passes which come regularly since the engine speed remains the same as far as he is concerned. In order to show clearly how diagram in Fig. 8 is obtained the line CD is drawn in Fig. 7 above the highest point of pass No. 1. Upon this line and 22 seconds from the time of entrance of billet No. 1 the passes of billet No. 2 are plotted in the same manner and to the same scale as those plotted on line AB in the lower diagram of Fig. 7. Since there is but one friction load, no matter how many billets are between the rolls at one time, and furthermore, since for the purpose of this article the friction load may be considered as not varying, no friction load area is allowed in the upper portion of the diagram in Fig. 7. Now, when billets 1, 3, 5, 2 and 4 have been plotted in Fig. 7, in constructing diagram in Fig. 8, each upper pass is moved in a vertical direction downward until the entire base-line of every such pass is in contact with the top line or lines of the pass or passes below or the friction load line. After this has been done and when the common lines between contiguous areas have been removed, the new diagram will appear as shown in Fig. 8. The ordinate of the line EF read from the zero line represents the average ordinate of any 44-second period in that diagram, and when read in the horsepower scale gives 820 as the average horsepower required for the "actual work" in question. Counting friction load, the engine would therefore have to develop normally 1,000 horsepower. The position of the line EF is, of course, easily determined with a planimeter. Knowing the horsepower which the engine is to develop normally and the character of the load, as shown in Fig. 8, the size and type of the engine, whether single expansion or compound or condensing, is easily determined.

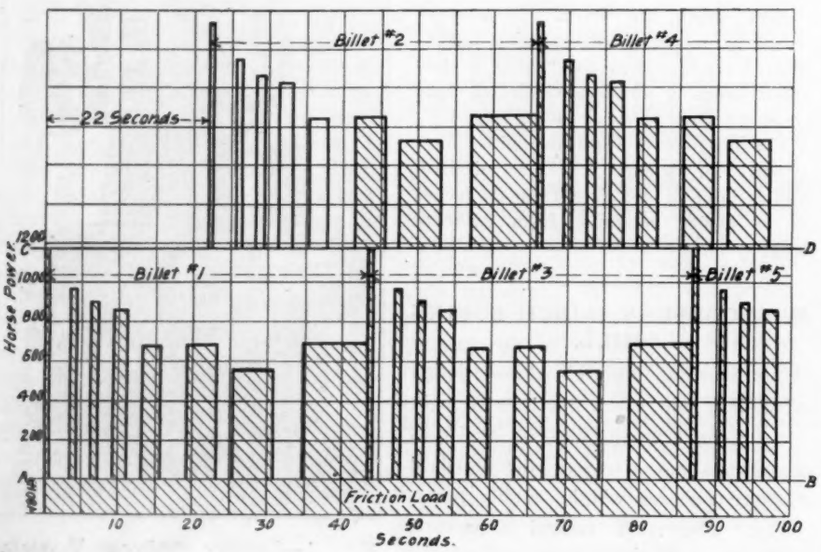


FIG. 7—DIAGRAM SHOWING RELATIVE POWER REQUIREMENTS.

Flywheel and Speed Reductions Considered.

Next in importance to the size of the cylinder in the rolling mill engine under consideration is the flywheel; here also the diagram in Fig. 8 will be found very useful.

Our first step is to fix definitely the speed reduction which normally is to be allowed in the engine. The lighter the flywheel, the greater are the variations in the speed for fixed loads. There are in operation rolling mill engines the speed of which drops 25 per cent and more during the peaks of the different passes. The writer considers an allowable speed reduction of 10 per cent better for normal operation because of the extra energy reserved in the flywheel and because there will be times when this extra reserve will be needed.

It should be stated here, however, that the speed reductions must be zero as regards the engine mill cycle, *i. e.*, the speed for the engine must regularly return at least once during every mill

cycle to its normal speed, for if at the end of every 44 seconds, which is the duration of a mill cycle during normal operations, it is found that the engine has lost in speed, it will eventually become stalled by reason of the cumulative nature of these losses. We shall therefore base our figures on a normal allowable speed reduction of 10 per cent during the peaks, with the understanding that at the beginning of all mill cycles the speed be the same.

Diameter of Flywheel.

At this point the diameter of the wheel must be decided upon. This decision should be based on the space in the mill available around the engine, on the work to be done and on the question of safety. If cast iron is the material used in the construction of the wheel, 85 feet per second should be considered the maximum allowable lineal speed of the rim in rolling mill practice so as to have a factor of safety sufficiently great for all possible emergencies. To determine the diameter of the flywheel for a rolling mill engine, a rule sometimes used is to make it from four to six times the length of the stroke. For the problem at hand we shall take the diameter of the wheel at 24 feet, because it appears from the diagram in Fig. 8 that heavy peak loads will have to be taken care of.

Energy Required of the Flywheel.

Having now fixed the speed reduction and the diameter of the flywheel, we must next determine the work which that regulator will have to do in the peaks 1, 2, 3, 4, etc. This may be done by means of the formula

$$W = 550\ T\ (H.\ P.)$$

where W = Work in foot pounds.

T = Time in seconds during which the flywheel is called upon to pay out energy, and

H. P. = horsepower of the peaks in question, 1, 2, 3, 4, etc., in Fig. 8 read from the line E F to the top of the peak. The peaks 6, 7, 9 and 11 should be divided into regular surfaces for convenience in computation. The work required of the flywheel during the different peaks as shown in Fig. 8 is as given in Table II.

Table II.—Slide Rule Computation.

Peak.	Foot-pounds.
No. 1	294,000
No. 2	308,000
No. 3	352,000
No. 4	41,000
No. 5	700,000
No. 6	783,000
No. 7	141,000
No. 8	352,000
No. 9	121,000
No. 10	605,000
No. 11	1 191,500
No. 12	308,000
No. 13	352,000
No. 14	41,000

Necessary Flywheel Weight.

We are now ready to proceed with the computation of the weight which the flywheel must have in order to do the above work. The energy given out by the flywheel by reason of its speed reduction is expressed by the equation

$$E = W \frac{V_{b^1}^2 - V_{l^1}^2}{2g} \qquad (1)$$

where E = Energy given out in foot pounds.

W = Energy-producing weight.

V_{b^1} and V_{l^1} = Lineal velocities in feet per second of the center of gravity of any rim section at the beginning and the end of the peak respectively, and

g = Acceleration of gravity.

Transforming and substituting for g we obtain for W

$$W = \frac{64.32\ E}{V_{b^1}^2 - V_{l^1}^2} \qquad (2)$$

The average speed of the roll surface is to be 6 feet per second and since the average diameter through the passes of the rolls is taken at 21 inches the average revolutions per minute of the engine will be 65.5. The diameter of the wheel was taken at 24 feet and a speed reduction of 10 per cent was agreed upon. The 65.5 revolutions per minute would give to the center of gravity of any rim section of the flywheel a normal speed of 82.4 feet per second and a 10 per cent reduction speed of 73.5 per second. If we now figure the weight of the flywheel for the heaviest peak, which is No. 11 in Fig. 8, in accordance with the above data and the formula given, we obtain

$$W = \frac{64.32 \times 1{,}191{,}500}{(82.4)^2 - (73.5)^2} = 55{,}600 \text{ pounds.}$$

which is the cast iron that must be distributed through the rim so as to take care of the peak loads. In wheels of this size about 25 per cent of their total weight is usually located in the arms and hub and figuring on this percentage would bring the total weight up to

$$\frac{55{,}600 \times 100}{75} = 74{,}000 \text{ pounds.}$$

In the energy computation of the flywheel it is commonly assumed that one-third of the weight of the arms and hub is concentrated at the circle passing through the center of gravity of the cross-section of the rim. The writer considers it best not to make an allowance in the present computation for this one-third, but rather to look upon it as a reserve weight since occasional unforseen conditions in rolling mill practice make very severe demands on the flywheel.

Flywheel and Intervals Between Passes.

We have now determined the dimensions both for the cylinder and for the flywheel. The flywheel dimensions have been worked out with regard to the heaviest peak load. This method of calculating flywheel dimensions is good enough as far as it goes, but it does not go far enough. When the peaks of the rolling cycle are being taken the engine speed will fall below normal for reasons already given. Dur-

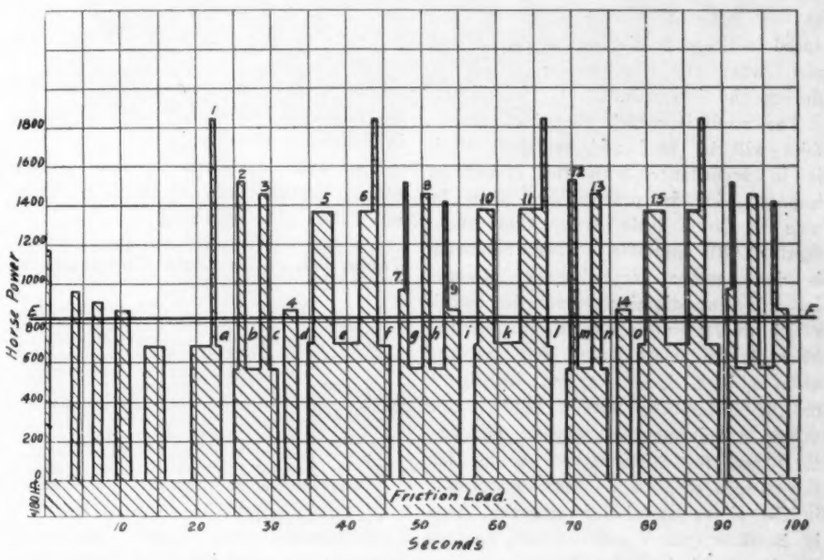


FIG. 8—DIAGRAM SHOWING COLLECTIVE POWER REQUIREMENTS.

ing the intervals between peaks the engine must regain sufficient speed so that in the following peak it will not fall below the 10 per cent reduction specified. Now if the cycle is of such a nature that the peaks come close together and that the intervals between passes or peaks are short, the revolutions of the engine may be reduced more than the specified 10 per cent. And if our investigation should show that at the end of the mill cycle the engine revolutions are less than they were at the beginning of the mill cycle, the engine would become stalled after a few billets have been passed through the rolls, if the specified rate of operation is kept up.

Speed Reduction and Final Consideration of Same.

The diagram in Fig. 8 will now be again of great aid to us in determining whether or not a greater speed reduction than the one specified will occur. Should the speed reduction be greater than that specified or should it be found that the speed becomes reduced as regards the mill cycle, one of three remedies may be chosen. First, the intervals between the passes may be made greater so that the engine be restored during the greater intervals to such a speed that it can take the heavy peak loads without falling below the allowed speed. Second, the reductions for the different passes may be changed so that the ratio between the maximum and average load becomes less. Third, a flywheel may be chosen that is heavier, or that is larger; or one that is both larger and heavier if the limited velocity of the rim can be raised.

We will therefore investigate now to what speed the engine will be restored during the intervals. In doing so we must determine what drop in speed will occur during the pass and also what the accelerating power is during the intervals.

The analysis which we shall undertake will be final and sufficient if it is in accordance with the conditions imposed, for in practice we shall be able to do a little better than these figures will indicate. This condition is due to the fact that we assume in this investigation that the work which increases the speed during the intervals is that shown only by the areas a, b, c, d, e, f, g, etc., in Fig. 8, or the difference between the average power requirement as shown by line E F and the friction load acting for the periods of time, as indicated clearly in the above mentioned diagram. This is, however, not wholly correct, because as the speed is reduced the governor of the engine will lengthen the cut-off, thereby raising the mean effective pressure in the engine cylinder and at the same time increasing the available power for raising the engine speed during the intervals. Just to what extent different governors lengthen the cut-off and to what extent the mean effective pressure is increased will not be discussed here in detail, since it would involve us in theoretical discussion of a mathematical nature which would be of little interest to the average practical rolling mill man. In view of the foregoing, it is sufficient for our purpose to state here that, if the following figures do not indicate a speed reduction greater than that specified, our engine will not only do the work demanded of it in this problem, but that it will be of ample size to do the work even if occasional peak loads greater than those shown in Fig. 8 occur, always provided, of course, that the speed as regards the entire mill cycle is also as required.

Engine Speed Determination.

In accordance with what has been said in the previous paragraph, it becomes necessary to determine the engine speed at the beginning and at the end of each peak load. Under peak loads are here considered all those shaded areas above the average load line E F in Fig. 8.

Solving equation (1) for V_{b^1} and V_{1^1} we obtain for these quantities

$$V_{b^1} = \sqrt{V_{1^1}^2 + \frac{2g\,E_p}{W}} \qquad (3)$$

where E_1 the available work in foot pounds in the intervals a, b, c, d, e, f, etc., in Fig. 8 computed in a manner similar to the quantities in Table II, and

$$V_{1^1} = \sqrt{V_{b^1}^2 - \frac{2g\,E_p}{W}} \qquad (4)$$

where E_p = the work required for the peaks 1, 2, 3, 4, 5, 6, etc., as shown in Table II directly.

The available work in foot pounds during the intervals, or E_1, is as given in Table III following.

Table III.—Slide Rule Computations.

E_1	for Interval	a	=	987,499 foot pounds.
E_1	for Interval	b	=	286,000 foot pounds.
E_1	for Interval	c	=	628,000 foot pounds.
E_1	for Interval	d	=	617,600 foot pounds.
E_1	for Interval	e	=	241,000 foot pounds.
E_1	for Interval	f	=	699,000 foot pounds.
E_1	for Interval	g	=	286,000 foot pounds.
E_1	for Interval	h	=	286,000 foot pounds.
E_1	for Interval	i	=	939,500 foot pounds.
E_1	for Interval	k	=	250 000 foot pounds.
E_1	for Interval	l	=	983 500 foot pounds.
E_1	for Interval	m	=	286,000 foot pounds.
E_1	for Interval	n	=	671,300 foot pounds.
F_1	for Interval	o	=	617,600 foot pounds.

Substituting the above values in equation (3) and those of Table II in equation (4) with all the other values, we find the engine speed at the beginning and the end of the peaks 1, 2, 3, 4, etc., as given in Table IV.

Table IV.—Slide Rule Computations.

No. of Peak.		V_{b^1}.	Rate of R. P. M. Corresponding to V_{b^1}.	V_{1^1}.	Rate of R. P. M. Corresponding to V_{1^1}.
1		82.4	65.5	80.3	63.85
2	(87)	82.4	(69.2) 65.5	80.2	63.75
3		82.25	65.4	79.7	63.45
4	(84.1)	82.4	(66.95) 65.5	82.0	65.2
5	(86.25)	82.4	(68.55) 65.5	77.2	61.4
6		79.0	62.9	73.05	58.1
7		78.45	62.4	77.25	61.45
8		79.5	63.2	77.0	61.25
9		79.0	62.9	78.1	62.05
10	(84.6)	82.4	65.5	77.95	61.9
11		79.7	63.4	70.55	56.1
12		78.25	62.25	75.9	60.4
13		78.1	62.1	75.5	60.0
14		80.1	63.7	79.7	63.4
15	(84)	82.4	(65.85) 65.5	.....	.....

Necessity for Changes Seen from Table IV.

If we now inspect Table IV, we notice that at the end of the 6th and the 11th peak the speed drops below the 10 per cent reduction specified. An examination of Fig. 8 tells us the reason, namely, peaks 5 and 6 and peaks 10 and 11 are much larger and of longer duration comparatively speaking than the other periods of that cycle. If a flywheel weighing 74,000 pounds were used, the engine would not become stalled in this work at any time during normal operations because an inspection of Table IV tells us that at the beginning of the 15th peak the engine would have returned again to full speed, and further, that the period from peak 5 to peak 15 constitutes one mill cycle of 43.5 seconds' duration. Since, therefore, the period from peak 5 to peak 15 constitutes one mill cycle, and since the speeds at the beginning and the end of this mill cycle would be 65.5 revolutions per minute, the engine would continue doing the work as outlined in Fig. 8, operating always at the same speed at the beginning and the end of every mill cycle without calling for a cut-off greater than that specified. This is of importance when we remember that the engine under discussion is to be most economical as regards steam consumption.

However, returning now to peaks 6 and 11, we pointed out before that the speed reduction is greater in those passes than was to be allowed. The remedies proposed in the event of such an outcome were three; first, greater intervals between the passes; second, a smaller ratio of the maximum load to the average load, and third, either a heavier or a larger flywheel, or one both larger and heavier.

To increase the intervals between the passes would curtail the specified ton-

nage and therefore cannot be considered here. If the period for each mill cycle were to remain as it is now to decrease the ratio of maximum load to average load would have a tendency to raise the average load line E F in Fig. 8 and therefore would necessitate a larger cylinder and also would mean more steam per ton of product rolled. The easiest way out of the difficulty, and, under the circumstances, the best way, is to obtain the required energy from the flywheel. To what extent the flywheel weight should be increased cannot be definitely fixed at once. Several trials may be necessary before that weight has been found which makes V_1^1, in the peaks in question, of such value that the speed reduction of the engine drop not below the required limit.

If we now let W = 75,000 pounds, the total weight of the flywheel would be

$$\frac{75{,}000 \times 100}{75} = 100{,}000 \text{ pounds.}$$

A flywheel of such a weight would give us speeds for the work to be done as shown in Table V.

Table V.—Slide Rule Computation.

No. of Peak.	V_b^1.		Rate of R. P. M. Corresponding to V_b^1.	V_1^1.	Rate of R. P. M. Corresponding to V_1^1.
1	82.4		65.5	80.8	64.2
2	(85.7)	82.4	(68.15) 65.5	80.85	63.3
3	82.2		65.4	80.35	63.8
4	(83.7)	82.4	(66.5) 65.5	82.1	65.35
5	(85.25)	82.4	(67.75) 65.5	78.5	62.45
6	79.99		63.5	75.5	60.25
7	79.55		63.25	78.75	62.6
8	80.25		63.8	78.45	62.35
9	79.98		63.5	79.15	63.0
10	(84)	82.4	(66.75) 65.5	79.0	62.8
11	80.45		63.9	73.8	58.65
12	79.45		63.1	77.7	61.75
13	79.05		62.85	77.15	61.4
14	80.7		64.15	80.4	63.9
15	(84.25)	82.4	(67) 65.5	.....	.....

Flywheel Found Now Satisfactory.

We see from an inspection of above table that if W equals 75,000, and if the diameter of the wheel is 24 feet, the speed does not at any time drop below the specified reduction.

Referring again to Table V, we see that V_b^1, for peaks Nos. 2, 4, 5, 10 and 15 is as indicated by the figure in parenthesis in the proper columns. This is, however, not the value substituted in equation (4) of the peak in question, because the governor is supposed to prevent the rise of speed above the specified normal by reducing the cut-off; 82.4 feet, which is the normal speed, is therefore the value substituted for V in equation (4) of the peak in question.

Conclusion.

The preceding method of determining the most economical size of a power generator for rolling mill work may be used with equal success if an electric motor, or a gas engine even, were to furnish power for any of the roll trains shown in the illustrations, provided, of course, that the constant C curve for the material to be rolled has been obtained and that the peculiarities and characteristics of these power generators are taken into consideration. Several constant C curves for different shapes are given in this article in Figs. 1, 2, 3, 4, 5 and 6. For the different types of reversing mills driven by steam engines the computation of the flywheel will, of course, be eliminated, but the cylinders will have to be designed large enough to take care of the peak loads when the engine is working at the proper speed and also a liberal allowance will have to be made for any possible premature cooling of the ingot. When there are several products of different sizes made in a mill, the power generator can, of course, be most economical only for one size. The size of the power generator which is most economical should then be worked out for each finished product in accordance with this article, and when this has been done that size should be chosen which for all sections will be most economical.

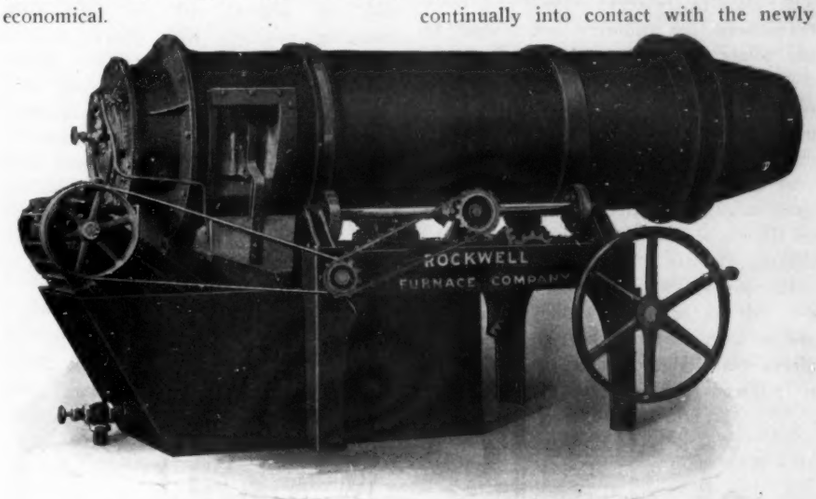


FIG. 1—ADJUSTABLE ANNEALING AND HARDENING FURNACE.

IMPROVED CONTINUOUS ANNEALING AND HARDENING FURNACE.

We illustrate herewith an improved type of rotary internally fired furnace made by the Rockwell Furnace Co., 26 Cortlandt street, New York, which adds to the flexibility of this type in respect of range of work and is claimed to add also to its durability.

Heretofore these furnaces have been built only with special lining brick which formed deep helical channels with separating spiral walls for feeding the material forward. This arrangement worked very well for light smooth pieces such as lock washers, balls, etc., and is still spirally lined for this class of work, but was found to be unsuitable for long pieces, such as bolts, rivets, etc., and irregular shaped steel punchings, forgings, castings, etc., and other methods of feeding the material through the furnace were required.

In the present type of furnace, for smooth or round work the rotating cylinder or drum is lined with a standard hard refractory brick, with a smooth internal surface. The furnace is mounted in such a manner that it may be tilted so as to bring the discharge end lower than the entrance or feed end. The incline causes the material to feed forward at a uniform rate and by means of the hand wheel the pitch angle may be adjusted so as to regulate this rate of progress of the material through the furnace and consequently the time and degree of heating.

The advantages of this method of automatic continuous heating are many; the material is charged in a hopper in bulk at the exhaust end of the furnace and fed automatically into the chamber and the material is brought continually into contact with the newly heated revolving surface, thereby absorbing the heat from the lining as well as from the heated gases. In a stationary furnace the heat from the sides and roof are not utilized, as the material remains in a fixed position, that farthest removed from the heat requires a much longer period to be brought to the desired temperature and the more exposed pieces are liable to be overheated, others insufficiently heated and a much longer time is required for all.

Tests of material heated and hard-

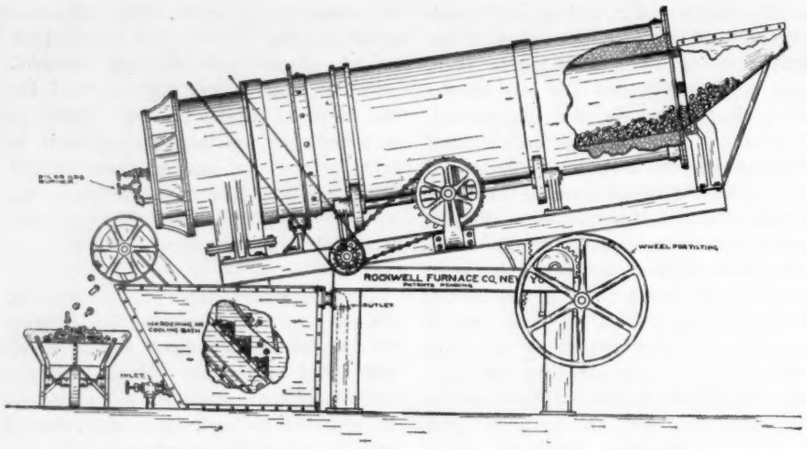


FIG. 2—ADJUSTABLE TYPE WITH PLAIN LINING.

ened in the internally fired rotary furnace at the rate of 2,000 pounds per hour have failed to show the slightest variation, as with a pyrometer to insure the proper temperature and the chamber tilted to feed at the proper speed the product must be absolutely uniform.

In operation, the pieces are fed continuously into one end of the cylinder and the furnace is fired internally from the opposite end with the zone of highest temperature at the discharge end. The cylinder revolves slowly (1 to 4 revolutions per minute) and owing to the slight inclination the work being treated gradually progresses toward the discharge end, where they enter a proper receptable or bath upon reaching the desired temperature. To prevent oxidation, the end of the discharge spout may be carried beneath the level of the bath, thereby sealing it and excluding the air.

By this method, clogging or retardation of the work is avoided, as there are no corners or pockets in which the pieces can lodge. Wear of the lining is reduced to a minimum and it is claimed that it does not require renewal until the greater portion of the brick is worked away. In certain classes of work, such as balls, nuts and uniform shapes, the helical or worm type is used, and this furnace may be lined either way, as preferred, but where the smooth lining can be used the cost is lower and a longer life is said to be insured.

Oil or gas fuel may be used, and perfectly uniform results obtained, as the work treated is heated gradually and, on account of its continually changing position with every portion of its surface exposed to the direct action of the hot gases and lining, both temperature and time are maintained constant. These furnaces are built to suit a wide range of requirements, and in sizes at present that will handle up to 2,000 pounds of stock per hour.

A steel canal has been constructed in connection with the Nile irrigation system at Wadi Komombo. This canal is 5,200 feet, almost exactly a mile, in length, and was designed to distribute water from the service reservoir to the earth canals. This steel canal is semi-circular in section, 12 feet deep and 20 feet wide. It is composed of riveted steel plate six millimeters—a little less than a quarter of an inch—in thickness. The canal was made in 17 sections, connected by expansion joints. Simple as the process of connecting the section might seem, the constructing engineers found it decidedly perplexing, the difficulty being the expansion of the metal, which was naturally greater on the side exposed to the sun. This inequality was at times sufficient to displace the end of a section, otherwise ready to be joined, as much as 4 inches. The canal is proving highly successful.—*Engineering Contracting.*

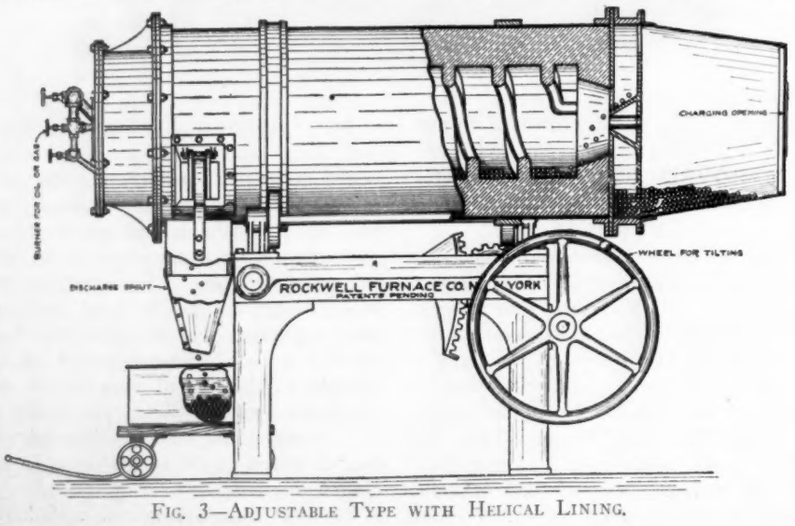


FIG. 3—ADJUSTABLE TYPE WITH HELICAL LINING.

NEW CATALOGS.

TOOL STEEL.—We have received from the Newman-Andrew Co., 107 West street, New York, an 18-page 3½ x 8-inch catalog of the tool steels manufactured by John H. Andrew & Co., Ltd., Toledo Steel Works, Sheffield, Eng., setting forth the different grades and applications of "Toledo" high-speed steel, and giving directions for forging, etc.

METAL SHINGLES.—The Wheeling Corrugating Co., Wheeling, W. Va., are distributing a 48-page, 6 x 8¼-inch catalog, describing their various designs of pressed metal shingles with numerous half-tone illustrations of their application to buildings of all descriptions, including public and railroad buildings, dwellings, stores, power houses, etc.

SCREW CUTTING TOOLS.—In a 72-page, 6 x 9-inch catalog, the American Tap & Die Co., Greenfield, Mass., describes their line of screw cutting tools, which cover not only standard taps and dies both for belt and pipe work, but an extensive line of special screw plates, die stocks, tap wrenches, stay and hob taps.

VALVES AND FITTINGS.—The Pittsburg Valve, Foundry & Construction Co., Pittsburg, have issued a 530 page, 6 x 9 inch catalog, descriptive of their line of valves and fittings of their own and other standard makes, which includes almost everything for the steam user and steamfitter from a 72-inch gate valve down to the smallest trade fittings.

ELECTRIC APPARATUS.—Bulletin No. 4,665, just issued by the General Electric Co., entitled "Electrical Operation of Pulp and Paper Mills," illustrates and describes the application of the electric motor to the paper industry. As an example of the application of electric drive in the manufacture of paper is given the plant of the United Box-board & Paper Co., Lockport, N. Y., with data relative to the number and size of the motors installed.

ROCK DRILLS.—Bulletin No. 4,009, issued by the Ingersoll-Rand Co., New York, describes the Temple-Ingersoll "Electric-Air" rock drills, with numerous illustrations showing their application and method of operation.

BLUEPRINT PAPERS.—The Keuffel & Esser Co., 127 Fulton st., New York, are distributing a circular on the above subject, giving lists and prices of their various grades.

NEWS FROM MANY INDUSTRIES

(In order to assist the post offices in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

New Buyers:—

The Johnson-Bone Switch Throw Co., Decatur, Ill., $40,000, by A. R. Scott, Max H. Hurd, J. L. Bone.

The Mueller Motor Car Co., Milwaukee, $20,000, by H. C. Mueller, Charles J. Hirsch, Peter Barth.

The Standish Chain & Mfg. Co., Kent, O., $18,000, by P. H. Standish, O. J. Schneider, Wallace Appleton, J. B. Carey, Dan Hinds.

The Orr Machine & Foundry Co., Zanesville, O., $10,000, by Clyde Reasoner, George Dieterly, C. R. Dieterly, Harry T. Orr, Simon Luiser.

The Saltzmann Mfg. Co., Chicago, $30,000, machinery, by George A. Chritton, Joseph Saltzman, Harry A. Williams.

Columbia Gas Stove Co., Huntington, W. Va., $25,000, by J. L. Hawkins, F. M. Hawkins, H. C. Taylor, Herman R. Wild, D. B. Given, all of Huntington.

Falls City Machinery & Supply Co., Spokane, Wash., $50,000, L. F. Boothe, William Watterson, George M. Holt.

Greenup Machine Co., Greenup, Ill., $8,000, cylinder boring devices, by Eb. Stewart, W. H. Shubert, John W. Ward.

The Altavista Foundry & Machine Co., Altavista, Va., $15,000; H. L. Lane, president; John E. Lane, vice president, Esmont, Va.; Frank Stevens, secretary, Lynchburg, Va.

Lawrence Iron & Steel Foundry Co., Pittsburg, $40,000. Treasurer: P. LeGoullon, Pittsburg. Directors: Oliver Wylie, Wilkinsburg, Pa.; P. LeGoullon, Wm. Yagle, Pittsburg, Pa.

National Machinery Co., Oklahoma City, Okla., $10,000, by N. O. Flemming, Ross N. Lilliard, W. M. Mitchell.

The Canada Producer & Gas Engine Co., Ltd., Barrie, Ont., $350,000, by Edward C. Hill, James Hales, C. M. Colquhoun and others.

American Electric Tool Co., Petersburg, Va., $100,000; officers, Louis Paulero, president; W. G. Andrews, vice president; B. B. Jones, secretary; W. H. Wilcox, treasurer, all of Petersburg.

The Crowe Mfg. Co., Hamilton, Ont., $40,000, valves, etc., Thomas Crowe, Archie Epstein, Michael McKenna and others.

Federal Engineering & Supplies, Ltd., Toronto, $100,000, John A. McAndrew, Norman R. Robertson and Harry H. Davis as provisional directors.

The Brantford Steel Range Co., Ltd., Brantford, Ont., $40,000. The provisional directors are: John Muir, W. D. Schultz, Geo. S. Matthews, Wm. T. Henderson and Joseph H. Ham.

Dominion Tack & Nail Co., Galt, Ont., $40,000, by George P. Clapp, John Eatough, George Turnbull and others.

New Construction—

The Manitowoc Foundry Machine Co., Manitowoc, Wis., has purchased ground upon which a plant is to be built. Col. W. M. Glenn, Waukesha, Wis., has taken an interest in the concern.

The Rasor Furnace Co., Barberton, O., has just closed a deal for land in Barberton to be used for a new site. The site is partly occupied by buildings formerly occupied by the Lilly Rubber Co.

The Pacific Metal Works, Portland, Ore., is engaged in building a foundry 30 x 70 feet and a warehouse 100 x 100 feet. The Oregon Brass Works will occupy the premises now held by the Pacific Metal Works as soon as the Pacific company moves to its new quarters, and will spend several thousand dollars in improvements.

The Richmond works of the American Locomotive Co., has been granted the right to divert Seventh street in Richmond, Va., so as to give the company another block which will be used for new buildings and other purposes. The company has awarded a contract for the construction of a new office building.

The H. J. Martin Forging Co., Indianapolis, was organized last week with an authorized capitalization of $75,000 and will build a plant in Harding street near Oliver avenue. Drop automobile and special forgings are to be manufactured. Officers of the company are: H. J. Martin, president; Carl H. Graf, vice president and Augustus Jennings, secretary and treasurer.

Owing to increased business, The National Steel Casting Co., of Montpelier, Ind., is building a large addition to its foundry. The building will be 120 feet long and will be equipped with modern machinery. The company believes the outlook for the steel business is exceptionally good.

General Industrial Notes:—

The Columbus Bolt Works, Columbus, O., announces that it is constructing a warehouse addition 60 x 280 feet four stories high.

Charles H. Waters, South Chicago, has leased the plant formerly occupied by the Riverside Iron Works and will open a machine shop.

The Hill-Tripp Pump Co., Addison, Ind., which was recently incorporated, advises that it will handle large capacity pumps and will be a selling company for the present at least.

The Waynesburg Forge Sheet & Tin Mills, Waynesburg, Pa., has been sold at receiver's sale for $22,000. A stock company is to be formed to operate the mills. The plant has been idle about five years.

The Canton Boiler & Engineering Co., Canton, O., has secured an order for a steel stand pipe 25 feet in diameter and 100 feet high for East Gardner, Mass. The company has also recently received an order for a stand pipe to be erected in Chicago 32 feet in diameter by 60 feet high. The shop is now running day and night shifts on steel mill and blast furnace construction and cotton seed oil tanks.

The Standard Gas & Electric Power Co., Philadelphia, capital $600,000, has been incorporated under the laws of Pennsylvania, by Samuel S. Eveland, president of The Standard Roller Bearing Co. The plant of the company is in West Philadelphia and is already in operation. Besides motor cars for commercial and pleasure purposes, the company will make a railroad car for use in interurban traffic on steam roads, which will be operated by a gas engine.

The Bullard Car Door Equipment Co., Birmingham, Ala., has taken a deed for several acres of land in that city, upon which it expects to erect a shop for the manufacture of car door equipment, to cost about $50,000. The building will be of brick, equipped with new machinery and driven by electric motors. When completed, it is expected that the building will contain a drop forge shop and rolling mill. R. G. Bullard is president and Peyton Norvell, vice-president.

The Felt & Tarrant Mfg. Co., makers of calculating machinery, has exercised an option for the purchase of the site occupied by its factory on Paulina street, Chicago. The price named

in the deed was $75,000. The land is improved with a reinforced concrete building two stories high.

The Vulcan Iron Works, of West Pittston, Pa., has secured a contract to build six cement machines for the Spanish-American Iron Co., of Santiago de Cuba.

The Baldwin Locomotive Works at Eddystone, Pa., has received contract for 10 new locomotives for the I. C. R. R. and 15 for the St. L. & S. F. R. R. The company is engaged in the construction of new shops at Eddystone.

The Columbus Iron & Steel Co., Columbus, O., has restored wages to the men in its plant to the 1907 level. The recent fire in the engine room of this company, temporarily delayed operation of the plant, but caused no very serious damage.

The Willamette Iron & Steel Works, Portland, Ore., has been awarded a contract by the Port of Portland commission for a sea going single screw tug, for which the bid was $92,350. She will be 116 feet over-all, depth 15 feet.

Steel was poured for the first time August 23, in the new plant of The Minneapolis Crucible Steel Co., Minneapolis. The plant will be used for general custom work and expects to get a good deal of business, which has hitherto gone to Milwaukee and Chicago.

The Dundee Brass Mfg. Co. has again started operations, having rebuilt its plant since the fire last May.

The board of directors of the Beaver Dam Malleable Iron Warks, Beaver Dam, Wis., has authorized the construction of a shipping room and an addition to the molding capacity of its Elm street plant, and also an enlargement of its shipping department at its Cedar street plant.

The Illinois Iron Bolt Co., Elgin, Ill., has been engaged lately in installing new machinery in its plant and expects to commence the manufacture of steel axles about the middle of this month.

A volume of business in a recent period of thirty consecutive days, which exceeded that done in any similar period, is one of the gratifying results lately recorded by the molding machine works of Henry E. Pridmore, Chicago.

The Worden-Allen Co., structural iron manufacturer of Milwaukee, has increased its capital stock from $250.000 to $300,000. Although the company has been in existence but a few years, it has experienced a remarkable growth and officials of the company predict that still further advances are to be made.

The complete award by The American Locomotive Co. of its crane inquiry is 24 cranes to The Morgan Engineering Co., of Alliance; five Shaw cranes to Manning, Maxwell & Moore, and five Niles cranes to Niles-Bement-Pond. These cranes are for the various plants of The American Locomotive Co. This is one of the largest crane contracts placed since the depression.

The Badger Motor Car Co., Columbus, Wis., is embarking in the automobile business and announces that it will need a few small lathes, drill presses, power hack-saws and probably one or two tool grinders.

The Eberton Brass Foundry Co. has been organized at York, Pa., by John H. Cochrane, formerly of the Pennsylvania Foundry Co., of that city, and Henry Rabe. This concern will engage in the manufacture of brass, bronze, composition and aluminum castings of all kinds.

D. W. Seely, Sodus Point, N. Y., manufacturer of evaporating furnaces, kiln pipes, bleachers and castings, is about to build a foundry of suitable size to take care of the output of an 8-ton cupola, including pattern shop, wood-working room, sheet iron department and rooms for manufactured and unmanufactured stock. Mr. Seely produces fruit evaporating furnaces.

The Isthmian Canal Commission asks bids up to Sept. 16 for the sale of old iron and steel in the canal zone, consisting of abandoned locomotives, cars, structural steel, old machinery, etc. Bids are asked up to Sept. 9 for the purchase of one screw-cutting engine lathe, one punching and shearing machine, one extension vertical boring and turning mill, dies, lathe dogs, canvas and rubber belting and belt dressing.

The Southern Produce & Cold Storage Co., Birmingham, Ala., is building a cold-storage plant at that place, to be four story, 125 feet x 75 feet, brick and mill construction, and cork insulated. The ice plant in connection, 50 feet x 182½ feet, one story, is to have a capacity of 60 tons of ice per day. The contracts for machinery are not yet let. Eugene T. Skinkle, 315 Dearborn street, Chicago, is consulting engineer in charge of the plans.

Contracts for a large amount of foundry equipment will be awarded in the next 30 days by the Best Foundry Co., Bedford, O., the casting producing department of the American Stove Co. This plant will be doubled in size by the erection of an addition, 200 feet long. The machinery to be purchased includes a cupola, blower, machinery for hoisting material to the charging floor, and approximately 25 molding machines will also be required. Henry Molder is superintendent of the foundry, and the Interstate Engineering Co. is preparing the plans.

Officials of the International Harvester Co. report their August output as well above that of August, 1908. In October the company expects to ship an entire cargo of harvesting machinery to the Black Sea.

President J. H. Plummer is quoted in the Boston *Financial News* as saying that the business of the Dominion Iron & Steel Co., is now at a point where the demand exceeds the capacity of the plant and that extensions are being pushed rapidly.

Consul General Robert P. Skinner reports from Hamburg, Germany, on the demand for American saws and says that the export trade to Germany in all kinds of saws could be greatly increased if Americans would give more attention to the field. He then says: "It is generally recognized in the trade that the steel used in American saws is particularly fine in quality and that our manufacturers have set a standard to which the manufacturers of all other countries are trying to attain. One large German concern, the largest in fact, now claims to be able to deliver saws equal in quality to those imported from America."

The Progressive Metal & Refining Co.'s plant, which will be erected at Milwaukee, will be provided with club rooms, shower baths and lunch rooms for the employes, so that at the end of a day's work, the men may leave the plant free from grime. The building will be thoroughly up-to-date and will be fitted with machinery of the most modern type for the purpose of refining all kinds of metals and for the manufacture of metal fixtures. The company will employ about 40 men in the new plant and will turn out 40 tons of metal daily. The company was incorporated a year ago with a capital stock of $5,000, which has now been increased to $100,000.

Fires:—

Fire broke out in the plant of William Hjorth & Co., Jamestown, N. Y., on the night of Aug. 27, and did several thousand dollars damage. The company makes wrenches and other mechanical appliances.

Hot steel billets set fire to a shed at the Sweet's Steel Co. plant in Williamsport, Pa., Aug. 23 and destroyed a dynamo.

Fire visited the plant of the Menough Foundry Co., Wellsville, O., Aug. 25, doing considerable damage to the pattern house and patterns.